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COMPARATIVE EVALUATION OF COSTS, QUALITY AND SYSTEM EFFECTS OF AMBULATORY SURGERY PERFORMED IN ALTERNATIVE SETTINGS

FINAL REPORT
DECEMBER, 1977

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ABSTRACT

The primary component of this project was a comparative evaluation of the costs, quality, and system effects of surgery performed in a freestanding ambulatory surgical center as compared with the alternative surgical settings in which similar procedures are performed (inpatient, traditional hospital outpatient, and hospital-affiliated ambulatory surgical centers). The three-year evaluation, focused on Phoenix, Arizona, was based on a large-scale primary data collection effort in which approximately 900 patients were traced through the surgical process. Direct observation of resources used during surgeries at seven institutions was supplemented by the abstracting of medical records, the analysis of institutional financial records and the interviewing of patients and physicians. In addition, data were collected on the total number and type of surgeries performed in 20 Phoenix institutions and were analyzed together with extensive secondary data.

THE ORKAND CORPORATION

TR-77W-102

COMPARATIVE EVALUATION OF COSTS, QUALITY AND SYSTEM EFFECTS OF AMBULATORY SURGERY PERFORMED IN ALTERNATIVE SETTINGS

FINAL REPORT

December, 1977

This report is made pursuant to contract #SSA-PMB-74-387. The amount charged to the Department of Health, Education and Welfare for the work resulting in this report (inclusive of the amounts so charged for any prior reports submitted under this contract) is $545,794. The names of persons, employed or retained by the contractor, with managerial or professional responsibility for such work, or for the content of the report, are as follows:

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The Project Officer for this contract was Mr. John Coyle, a staff member within the Office of Demonstrations and Evaluations, Office of Policy Planning and Research. The views and opinions expressed in the report are the contractor's and no endorsement by the Health Care Financing Administration or Department of Health, Education and Welfare is intended or should be inferred.

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We would also like to acknowledge current and former Orkand Corporation staff members, other than the principal authors who contributed to the report: Dr. Allen Berkowitz, who supervised a major segment of the data collection; Mr. Albert Lowey Ball, who prepared an initial draft of Chapter V; and Mr. Arthur Janovsky, who assisted in the data processing and in the analysis of the physician interview data.

Of particular importance to success of this effort was the contribution of the HCFA Project Officer, Mr. John Coyle, who participated actively in the project from its inception, and provided continued support, assistance, and technical guidance.

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I. INTRODUCTION

PURPOSE

This is the Final Report of an evaluation of the cost, quality and system impact of surgery performed in alternative settings. The three year evaluation, which was focused on Phoenix, Arizona, was based on a large scale primary data collection effort in which approximately 900 patients were traced through the surgical process. Direct observation of resource utilization was supplemented by the abstracting of medical records, the analysis of institutional financial records and the interviewing of patients and physicians. The entire effort was conducted under contract No. SSA-PMB-74-387 with the Health Care Financing Administration (HCFA).

This report presents the evaluation findings in the context of the project background and objectives and the methodology employed. Other reports resulting from this project are described later in this section.

PROJECT BACKGROUND

The rapidly rising cost of health care has been a matter of increasingly critical concern to health professionals, administrators, and consumers in recent years. One response to the problem has been the development of freestanding facilities for the performance of certain less complex surgical procedures on an ambulatory, or outpatient basis. While inpatient facilities have long utilized their facilities for outpatient care (designated in this report as the "traditional hospital outpatient" setting), the organization and construction of ambulatory surgical centers--those centers organized principally or solely for the performance of ambulatory surgery and which are physically distinct from other institutions--is a relatively recent development. The earliest units at the U.C.L.A. Medical Center and at the George Washington University Hospital were followed by numerous others including, in 1970, the Surgicenter in Phoenix, Arizona. The Surgicenter was a prototype of the freestanding ambulatory surgical centers, i.e., those which, in addition to the above characteristics, are organizationally distinct from other institutions. Currently, there are a considerable number of ambulatory surgical centers--both freestanding and hospital-affiliated--functioning across the nation.

Proponents of the ambulatory surgical concept claim that these facilities can perform a certain number of "minor" surgical procedures at a substantially lower cost than would be incurred in inpatient settings, while maintaining at least an equal level of quality. Additionally, to the extent that ambulatory surgeries are substituted for inpatient surgeries, fewer inpatient beds would be needed. And finally, ambulatory surgery supporters assert that these facilities can treat ambulatory patients more effectively, since this class of patients is their sole concern.

The policy issue facing the Health Care Financing Administration is whether the facility fees charged by freestanding ambulatory surgical centers should be reimbursed under Medicare. At present, the Medicare Statutes provide for such payment to be made only for ambulatory surgery procedures that have been performed in facilities qualified as a "providers of services." (These facilities are currently defined in the Social Security Act as a hospital, extended care facility, or home health agency). In an experiment authorized under Section 222(b) of P.L. 92-603, the Bureau of Health Insurance began on April 1, 1974, to reimburse facility fees of the Phoenix Surgicenter for Medicare patients. (Subsequent to that date, the facility fees of several other ambulatory surgical centers have also been reimbursed for Medicare patients on an experimental basis.)In funding the experiment, the Bureau of Health Insurance has considered it possible that the performance of certain surgical procedures in freestanding ambulatory surgical centers may result in savings for the Medicare program, while not adversely affecting the quality of care. To test the possibility of cost savings and to determine whether there are differences in the quality of surgery performed in different settings, HCFA awarded a contract to The Orkand Corporation to conduct evaluative research in ambulatory surgery. One element of the overall contractual requirement is an evaluation of the Phoenix Surgicenter.

The Phoenix Surgicenter is a freestanding surgical facility that has been operating since 1970. Through December, 1977, more than 47,200 surgical procedures have been performed there in its operating rooms (six at present). The procedures performed include several which had previously been performed predominantly on an inpatient basis such as laparoscopies, eye muscle operations, and tonsillectomies. The most common procedures, however, include several which have traditionally been performed on an outpatient basis (simple myringotomies, ganglionectomies, and excisions of skin lesions).

During the period of the study, The Surgicenter was owned, managed, and partially staffed by two anesthesiologists, Dr. Wallace Reed and Dr. John Ford.[1] All surgeons who have been admitted to the staff of a Phoenix area hospital were given staff privileges at the Surgicenter.

The possibility that freestanding ambulatory surgical facilities may perform certain surgical procedures at a lower cost than hospitals was the basis for the interest of the Health Care Financing Administration and has been the primary factor in shaping the evaluation. However, the surgical cost, quality and impact issues related to the development of such facilities extend beyond the Medicare program. Although HCFA's primary objective is to determine whether freestanding facilities should be reimbursed for the use of their facilities by Medicare patients, the implications examined during the project extend beyond this patient group. The implications of potential national health insurance programs and the overall significance of evaluating a new mode of health care delivery have influenced the approach utilized.

PROJECT OBJECTIVES

The overall project objective can be summarized as the evaluation of the cost, quality, and system impact of surgery performed in a freestanding ambulatory surgical center as compared with the surgical settings in which similar procedures are performed (inpatient, hospital outpatient, hospital-affiliated ambulatory surgical centers, and physicians' offices). Within this overall objective are a number of individual objectives under each of the analysis areas of cost, quality, and impact. These are:

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[1] Dr. John Ford ended his affiliation with the Surgicenter during 1977.

Cost Objectives

- The major objective of the cost analysis is the comparison of the costs of performing surgery in alternative settings. The primary focus is on the total cost of a surgical episode, including both direct and indirect service costs as well as the opportunity costs of a procedure.

- Additional cost objectives include:

    - comparison of the individual components of service costs
    - comparison of costs by surgical phase and cost element
    - comparison of facility charges and their relationship to costs
    - determinations of Medicare program costs for surgical procedures in alternative surgical settings.

Quality Objectives

- The initial objective of the quality study is an analysis of the structural aspects of surgical quality across surgical settings. This includes such elements as organizational characteristics, policies and procedures, staff qualifications, and facility physical characteristics.

- A second quality objective is the analysis of the process quality of patient treatment in alternative settings, from patient screening through recuperation in the surgical episode. In this part of the study, a detailed examination across surgical settings was made of the treatment characteristics and background medical characteristics of patients undergoing twelve selected procedures.

- The third quality objective is the analysis of the results of the surgical episode. This includes the effect of the surgery on the problem being addresed, complications resulting from the surgery, and patients' and physicians' satisfaction with the surgical episode.

- The final quality objective is the analysis and description of the demographic and medical characteristics of the patient populations undergoing procedures in alternative settings. The purpose of this is to determine any shift over time in the patient populations and determine whether the screening procedures used in alternative settings result in different population groups undergoing procedures in alternative settings (an example would be healthier surgical candidates for these minor procedures being more prevalent in ambulatory settings).

Impact Objectives

The following are the seven principal objectives of the impact analysis:

- A determination of changes in utilization of surgical services in Phoenix, Arizona.

- A determination of changes in distribution of surgical procedures across alternative surgical settings.

- An examination of changes in the frequency and setting for procedures that are Outpatient Eligible (OPE).

- An examination of changes in the availability of surgical resources.

- An examination of changes in surgical facility prices and revenues.
- An analysis of the response of the Phoenix health system to FSASC innovation and competition.
- A determination of the effects of Medicare reimbursement of the FSASC on the surgical demand for outpatient surgery for the Medicare population.

These study objectives are discussed in greater detail in each chapter of the report and are addressed by the analyses contained in those chapters.

ORGANIZATION OF THIS REPORT

This report is designed to present the main findings from the analysis of the comparative advantages and disadvantages of a freestanding ambulatory surgical center as compared with other surgical settings. The project findings are organized into those relating to the cost, quality, and impact of ambulatory surgery, with each set of findings being presented in a separate chapter along with the related project objectives, analytic issues, and methodological summary. The major analytic findings are presented throughout each of these chapters and are also summarized at the conclusion of each. The report contains the following chapters:

- Chapter I presents an Introduction to the report, and discusses its scope and organization, other reports resulting from the project, and the project background and objectives.
- Chapter II deals with the Phoenix Environment in which the evaluation of the Surgicenter took place. This chapter reviews the physical, demographic, socioeconomic, and health care characteristics of Phoenix and of nearby Arizona communities.
- Chapter III presents the analysis of the cost of performing surgery in the freestanding ambulatory surgical center as compared to costs in other settings.

- Chapter IV presents the analysis of the quality of surgical care, and basically assesses whether the quality of surgical care varies by the type of setting in which the surgery is performed.

- Chapter V examines the impact of a freestanding ambulatory surgical facility in the delivery of surgical services in Maricopa County, Arizona.

OTHER REPORTS RESULTING FROM THIS PROJECT

In addition to this report presenting evaluation findings, the following additional reports dealing with ambulatory surgery have also been completed during this project:

- An Executive Summary, which presents a concise summary of the major study findings, as well as brief discussions of the project methodology and objectives.

- Profiles of seven Ambulatory Surgical facilities, which provide basic empirical and descriptive data on each. Information presented includes the historical background and development of each facility, the characteristics of the patients and physicians utilizing the facility, the physical and organizational characteristics, and a discussion of the fee structure and financial position of each facility.

- A Study of the Federal and State Legislation and Regulations dealing with ambulatory surgery.

- A methodological Appendix, presenting detailed discussions of the methodology and procedures used to collect the data, the definitions and conventions used, the selection of the facilities and surgical cases included in the study, and a complete set of the data collection instruments and instructions.

II. THE PHOENIX ENVIRONMENT

INTRODUCTION

This chapter presents a brief description of the Phoenix, Arizona environment in which the evaluation of the Surgicenter took place. It is designed to give the reader who may not be familiar with the area a basic understanding of the physical, demographic, socioeconomic, and health care characteristics of Phoenix and its surrounding area.

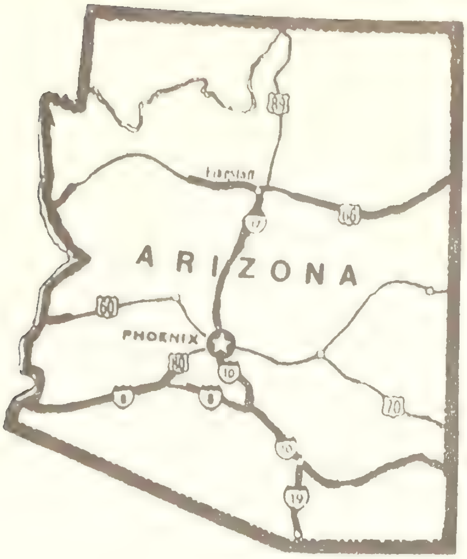
PHYSICAL CHARACTERISTICS

Maricopa County is comprised of approximately 10,000 square miles in southwestern Arizona. The major metropolitan center is the City of Phoenix with a population of nearly 700,000 inhabitants. The surrounding metropolitan area includes an additional population of approximately 500,000. About 10% of the population of Maricopa County lives in the vast rural areas outside of the Phoenix metropolitan area.

Although Phoenix is the largest city in the county, a number of relatively large cities are adjacent to Phoenix, including Glendale (population of about 36,000), Mesa (63,000), Scottsdale (68,900), and Tempe (63,000). These cities and a number of smaller towns are located in a large valley surrounded by vast mountain and desert regions in the remainder of the County. Exhibit II-1 depicts the location of Phoenix within the State of Arizona and also shows its relationship to the surrounding areas as well as major geographic features. The location of the seven institutions included in the impact study is also designated.

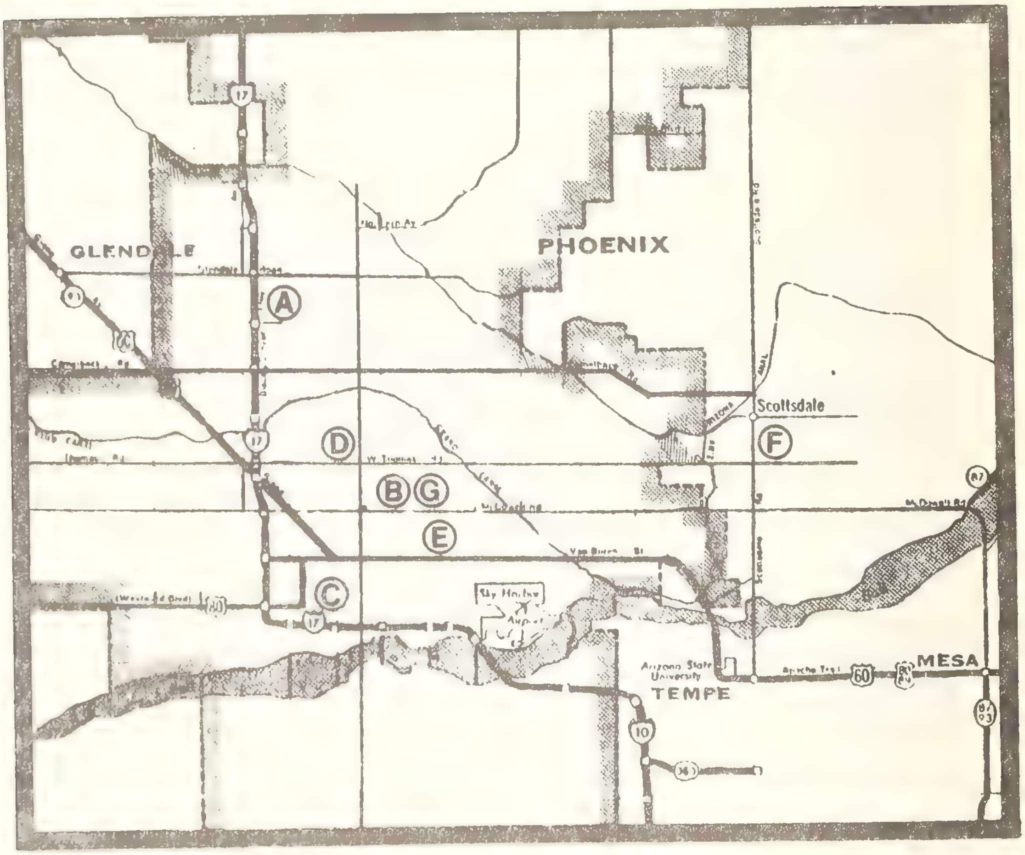
Exhibit II-1

Maps of Arizona and the Phoenix Area Showing Impact Institutions



IMPACT INSTITUTIONS

- Ⓐ Phoenix Baptist Hospital
- Ⓑ Good Samaritan Hospital
- Ⓒ Memorial Hospital
- Ⓓ St. Joseph's Hospital
- Ⓔ St. Luke's Hospital
- Ⓕ Scottsdale Memorial Hospital
- Ⓖ Surgicenter



DEMOGRAPHIC CHARACTERISTICS

According to a 1975 estimate by the State of Arizona, the total population of Maricopa County is approximately 1.2 million people. Of that number, 670,000 live in Phoenix City. The population of the City of Phoenix quadrupled during the 1950s. During the 1960s and early 1970s, the pace of population growth slowed down somewhat. Greater Phoenix--Phoenix City plus incorporated suburbs--and Maricopa County as a whole grew faster than the city itself. Exhibits II-2 and II-3 show that Maricopa County's population from 1960 to 1975 became less concentrated within Phoenix. From 1970 to 1975, the ratio of population of greater Phoenix to Maricopa County remained constant, at about 87%. Hence, estimates of population changes of Maricopa County are used as proxies for changes in population of greater Phoenix. Greater Phoenix constitutes the area for which impacts of Surgicenter are evaluated. An additional view of the growth of population in the Phoenix area in the 1966 to 1975 period is shown by Exhibit II-4 which shows Phoenix' population growth graphically.* Ethnically, the population distribution remained virtually constant in the period 1968-1975, with the number of Mexican-Americans growing slightly, while other ethnic groups fell slightly. The ethnic distribution of greater Phoenix remained relatively constant at about 80.0% white, 14.6% Mexican-American, 3.3% Black, and 1.6% American Indian. The ethnic distribution of the population is shown in Exhibit II-5.

Exhibit II-6 shows the age and sex distribution of the Maricopa County population over the interval 1970 to 1975. As is shown, all of the age and sex groups grew in absolute terms, but some more quickly than others, changing the age distribution of the population over even this short time period. Two age-sex groups at high risk for surgery--women from 15 to 44 and men over 65--are seen to be among those gaining fastest. This relatively fast growth in the two surgery-prone groups may have contributed to the overall increase in the number and rate of surgeries performed in the Phoenix area during this period. This is discussed in detail in the analysis of the impact of the ambulatory surgical center in Chapter V, below.

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*Exhibit II-4 is also presented as Exhibit V-16 in Chapter V, where it is included so that the analysis in that chapter of surgical rates per 1,000 population can be complete. A number of the exhibits in the section on Health Care Characteristics, below, are also presented in Chapter V for the same reason.

Exhibit II-2

Population of Phoenix and Maricopa County
1960-1975

AREA / YEAR	MARICOPA COUNTY	PHOENIX CITY	GREATER PHOENIX
1960	663,510	439,170	543,866
1966	870,000	511,000	--
1967	890,000	519,000	--
1968	914,000	528,000	--
1969	946,000	546,000	--
1970	971,228	581,562	847,261
1971	1,014,000	606,000	--
1972	1,065,800	627,000	--
1973	1,126,600	646,000	--
1974	1,180,200	660,000	--
1975	1,217,500	669,005	1,055,955

Source: Arizona State Department of Economic Security, Population Estimates of Arizona, Annual Reports, 1967-1975. Data compiled jointly with the U.S. Bureau of the Census.

Exhibit II-3

Population Growth Rates of Phoenix And Maricopa County, 1960-1975

AREA / PERIOD	MARICOPY COUNTY	PHOENIX CITY	GREATER PHOENIX
1960-1975	83.5%	52.3%	94.2%
1970-1975	25.4	15.0	24.6
1966-1975	39.9	30.9	--
1969-1975	28.7	22.5	--

Source: Exhibit II-1

Exhibit II-4

Population of Maricopa County, Arizona

1966-1975

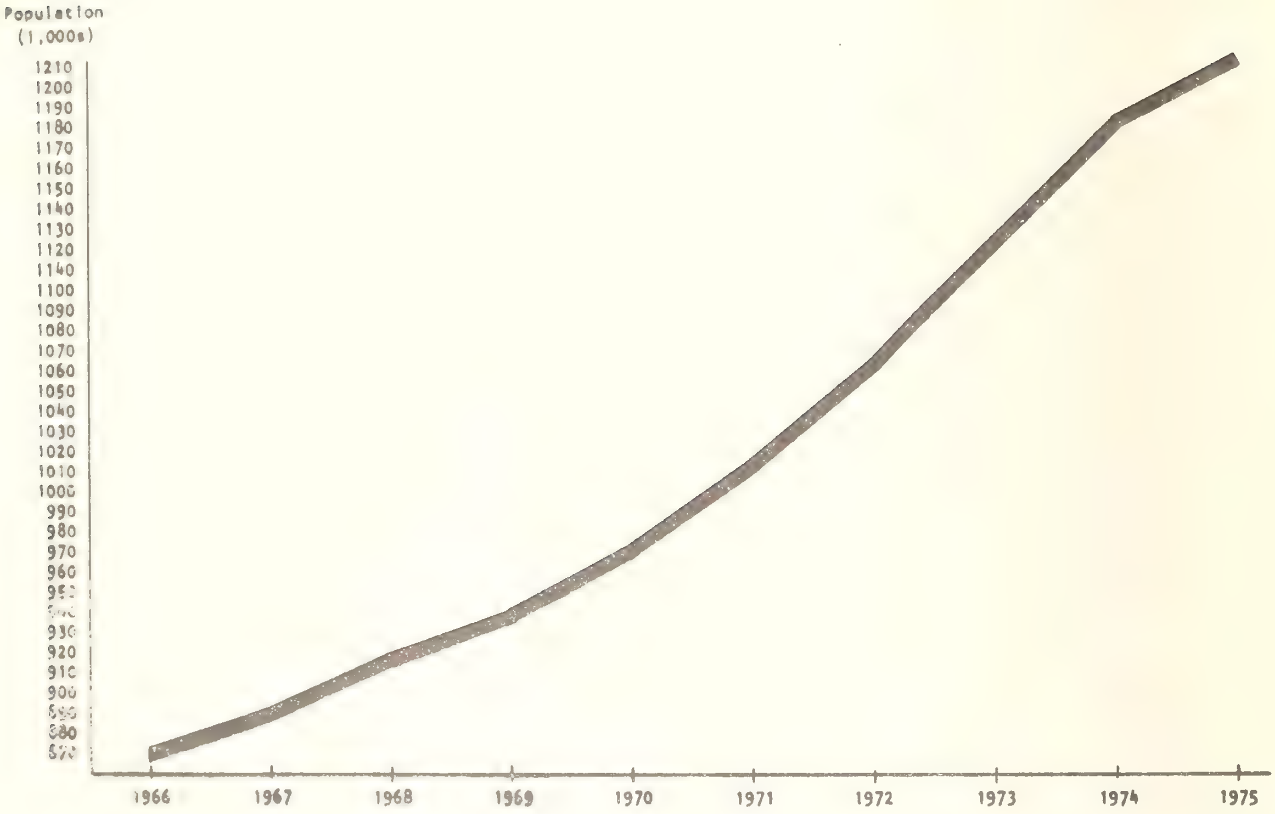

Exhibit II-5

Ethnic Distribution of
Maricopa County Population

GROUP YEAR	ANGLO	MEXICAN	BLACK	AMERICAN INDIAN AND ORIENTAL	TOTAL
1968	81.9%	12.2%	3.8%	2.1%	100.0%
1970	81.4	13.2	3.4	2.0	100.0
1972	80.0	14.4	3.4	1.8	100.0
1973	80.0	14.5	3.4	1.7	100.0
1974	80.0	14.6	3.3	1.7	100.0
1975	80.0	14.6	3.3	1.6	100.0

Source: Arizona Department of Economic Security.

Exhibit II-6

Distribution of Maricopa County Population by Age and Sex

AGE GROUP		0-1		2-14		15-44		45-64		65+	
YEAR, SEX		No.*	%	No.	%	No.	%	No.	%	No.	%
FEMALE	1970	16.8	3.4%	124.6	25.1%	206.0	41.5%	99.8	20.1%	49.2	9.9%
	1975	20.0	3.2	133.7	21.4	271.7	43.5	126.2	20.2	72.5	11.6
MALE	1970	17.5	3.7	129.1	27.3	196.3	41.5	88.9	18.8	41.1	8.7
	1975	21.3	3.6	138.7	23.4	261.5	44.1	111.5	18.8	59.9	10.1

*In thousands.

Source: Arizona State Department of Economic Security

SOCIOECONOMIC CHARACTERISTICS

In terms of most measures of socioeconomic status, Maricopa County is comparable to Arizona and to the entire U.S., as is shown in Exhibit II-7. The number of median years of schooling completed, for instance, and the median level of income of Maricopa County is almost identical to that of the U.S., although the income level of the state is somewhat lower. For measures of housing, one measure shows Maricopa County better off but another shows it to be worse off.

HEALTH CARE CHARACTERISTICS

Manpower

The Maricopa County health care delivery system grew rapidly over the period 1968-75, paralleling the rise in population. Exhibit II-8 presents data on the number of physicians in Greater Phoenix during this period. As is shown, the total number of physicians increased from 886 in 1967 to 1,349 (a rise of 52.3%) just eight years later. The number of doctors with a surgical specialty rose from 276 to 466 (68.8%) during the same period.

While the number of Phoenix physicians and especially surgeons rose dramatically in the 1967-1975 period, Exhibit II-9 shows that the number of physicians per 10,000 population rose relatively slowly, from 10.0 per 10,000 in 1967 to 11.1 in 1975, a rise of 11.0%. The total number of surgeons, however, rose from 3.1 per 10,000 to 3.8, a rise of 22.6%. The number of general surgeons per 10,000 actually declined, while otorhinolaryngologists and ophthalmologists increased considerably.

In addition to the numbers of physicians described above, the Arizona Department of Health Services reports that in 1974 Maricopa County had 11 physician's assistants, 18 nurse practitioners, 923 pharmacists, 7,073 RNs, and 2,055 LPNs. Unfortunately, data are not available on the numbers of these personnel over time.

Exhibit II-7

Comparison of U.S., Arizona, and Maricopa County Measures of Socioeconomic Status, 1970

Variable	U.S.	Arizona	Maricopa County
SOCIO-ECONOMIC FACTORS			
Family Status			
Med. Fam. Size	3.2	3.2	3.1
% Fem. Hds. of Hshld. w/Dep.	10.9	10.4	10.2
Housing			
% Inadequate Plumbing	6.9	4.8	2.5
% Crowding (> 1.51 Persons/Rm.)	2.2	5.2	3.2
Education (25+ years of age)			
Med. School Yrs. Comp. (25+)	12.2	12.3	12.3
% School Yrs. Comp. (None)	1.6	2.4	1.0
% Elemen. School Yrs. Comp. (8)	13.4	11.0	11.0
% High School Yrs. Comp. (12)	34.0	31.6	32.0
% College Yrs. Comp. (16)	11.0	6.7	12.0
Income			
Med. Income	$ 9,867	$ 9,187	$ 9,856
% Fam. below poverty level	10.7	11.5	8.9
% Fam. receiving pub. asst.	22.4	20.3	18.7
Med. value of owner-occ. D.U.*	$17,000	$16,300	$17,300
Med. rental for rent-occ. D.U.	$ 90	90	105

* Dwelling Units

Source: Maricopa County Health Planning Council.

Exhibit II-8

Physicians in Surgical and Other Specialties
Active in Greater Phoenix, 1967-1975

Specialty / Year	1967		1968		1969		1970		1971		1972		1973		1974		1975	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Gynecological	75	27.2	79	28.0	75	24.2	88	26.7	88	24.0	96	24.4	93	22.6	97	22.9	104	22.3
Otorhinolaryngological and Ophthalmologies	42	15.2	42	14.9	45	14.8	46	13.9	51	13.9	66	16.8	70	17.0	80	18.9	86	18.5
General Surgery	99	35.9	99	35.1	121	39.0	112	33.9	129	35.2	134	34.1	137	33.3	138	32.6	132	28.3
Cardiovascular	10	3.6	11	3.9	10	3.2	16	4.8	16	4.4	14	3.6	21	5.1	21	5.0	21	4.5
Neurological	8	2.9	9	3.2	10	3.2	14	4.2	14	3.8	14	3.6	15	3.6	15	3.5	17	3.6
Gastrointestinal	0	0	0	0	0	0	1	.3	2	.6	3	.8	5	1.2	3	.7	3	6
Pediatric	2	.7	2	.7	3	1.0	3	.9	4	1.1	4	1.0	4	1.0	4	.9	6	1.2
Orthopedic	32	11.6	29	10.3	37	11.9	37	11.2	45	12.3	42	10.7	45	11.0	48	11.3	68	14.6
Urological	1	.4	2	.7	2	.6	3	.9	3	.8	3	.8	4	1.0	3	.7	3	.6
Plastic	7	2.5	9	3.2	7	2.3	10	3.0	14	3.8	17	4.3	17	4.1	15	3.5	26	5.6
Total Surgeons	276	100.0	282	100.0	310	100.0	330	100.0	366	100.0	393	100.0	411	100.0	424	100.0	466	100.0
Anesthesiologists	39		38		46		55		61		60		64		65		68	
Total Physicians	886		891		938		1,058		1,054		1,062		1,100		1,145		1,349	

Source: Phoenix Yellow Pages, 1967-1975. Surgeons were classified by "first surgery listing", since many listed more than one specialty. Active was defined to mean listed in the Yellow Pages, under the assumption that inactive surgeons would not advertise. It is possible that some salaried physicians on hospitals are not included in this Exhibit. Further, many of the unclassified physicians—those who did not list surgery specialties can and did perform surgery at Impact and other health care institutions.

Exhibit II-9

Number of Physicians and Surgeons per 10,000 Population, Maricopa County, 1967-1975

Physician Specialty / Year	1967	1968	1969	1970	1971	1972	1973	1974	1975
All Physicians	10.0	9.8	9.9	10.9	10.4	10.0	9.8	9.7	11.1
All Surgeons	3.1	3.1	3.3	3.4	3.6	3.7	3.7	3.6	3.8
Gynecologists	.84	.86	.79	.91	.87	.90	.83	.82	.85
Otorhinolaryngologists and Ophthamologists	.47	.46	.48	.47	.50	.62	.62	.68	.71
General Surgeons	1.14	1.08	1.28	1.15	1.27	1.26	1.22	1.17	1.08

Source: Phoenix Yellow Pages, 1967-1975. Surgeons were classified by "first surgery listing", since many listed more than one specialty. Active was defined to mean listed in the Yellow Pages, under the assumption that inactive surgeons would not be listed. It is possible that some salaried physicians on hospitals are not included in this Exhibit. Further, many of the unclassified physicians—those who did not list surgery specialities—can and did perform surgery at impact and other health care institutions.

Facilities

Hospital care in the Phoenix area is provided through more than 20 inpatient facilities, listed in Exhibit II-10. The number of hospital beds in greater Phoenix, as shown in the exhibit, increased from 3,119 in 1966 to 4,549 in 1975. However, as is shown in Exhibit II 11, the bed rate of hospitals in the area per 1,000 population rose until about 1971, after which it fell back to the extent that it changed very little during the entire period, from 3.6/1,000 to 3.7/1,000 population.

The utilization of these acute inpatient facilities is shown in Exhibits II-12 and II-13, which show the occupancy rates at selected Phoenix hospitals and the number of surgery, non-surgery, and total inpatient days per 1,000 population. As is shown, the occupancy rate of these facilities fell considerably from 1967 to 1975, then rose gradually. Over the whole period, occupancy fell from 85.8% to 78.6%. The total number of inpatient days per 1,000 population, however, rose during the period, reaching a peak in 1971, with a decline in surgical days being overcome by a greater rise in non-surgery days.

In addition to these inpatient acute facilities, in 1974 Maricopa County had 34 Nursing Home Facilities, containing a total of 2,547 beds.* Other facilities in the County in 1974 included 13 Mental Health Centers, 27 State-Contracted Drug Abuse Centers, and one Rehabilitation Center. Finally, five HMOs were also provding care in the area and these operated 18 primary care centers (which in some cases also provided care to non-enrollees) and had a total of 48,303 members.

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*FY 1975 State Plan for Health Facilities.

Exhibit II-10

Hospital Bed Capacity in Greater Phoenix by Institution, 1966-1975

Year / Institution	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Good Samaritan	476	476	517	644	691	715	691	699	699	691
St. Joseph's	453	411	450	445	515	570	564	560	560	563
St. Luke's	114	128	118	118	290	286	304	290	290	316
Doctors	216	301	301	305	300	300	300	300	300	300
Scottsdale Memorial	109	154	136	136	208	233	222	220	236	236
Phoenix Baptist	107	124	118	119	119	119	119	170	170	170
Memorial	147	147	154	159	185	159	159	162	131	139
Maricopa County General	460	349	385	398	467	493	493	495	495	495
John C. Lincoln	114	114	131	120	166	202	202	181	184	184
Phoenix General	112	196	198	196	200	198	240	240	234	234
Boswell Memorial	0	0	0	0	0	0	206	206	141	151
Desert Samaritan	139	138	139	139	139	149	204	204	174	175
Arizona Children's	70	70	84	87	84	84	162	162	130	130
Maryvale Samaritan	140	140	140	146	147	147	147	147	143	143
Glendale Samaritan	62	62	62	62	62	62	62	62	62	62
NHE Community	50	50	50	50	50	50	50	50	50	50
Mesa General	70	68	64	68	105	105	105	105	105	105
Mesa Lutheran	170	167	169	169	169	169	250	250	250	250
NHE Community Scottsdale	0	0	0	0	0	0	34	34	34	34
Chandler Community	42	42	42	42	42	42	42	42	40	40
Tempe Community	68	68	62	63	63	62	81	81	81	81
Total Bed Capacity	3,119	3,205	3,310	3,458	4,002	4,105	4,637	4,660	4,509	4,549

Note: Scottsdale Memorial, Desert Samaritan, and Glendale Samaritan were formerly known as Baptist Hospital of Scottsdale, Northwest, and Southside Hospitals, respectively.

Sources: Data from impact hospitals came directly from the institutions. Data on the other hospitals came from either the American Hospital Association, Guide Issue, 1966-1975, or from the Hill-Burton Program administered by the Arizona Department of Health Services. In some years, these sources conflicted; the Guide Issue data was the preferred source, since the Hill-Burton data were based on construct plans. The VA, IHS, and St. Luke's Air Force Base Hospitals were omitted.

Exhibit II-11

Bed Rate (Per 1,000) for All Hospitals and Impact Hospitals, 1966-1975

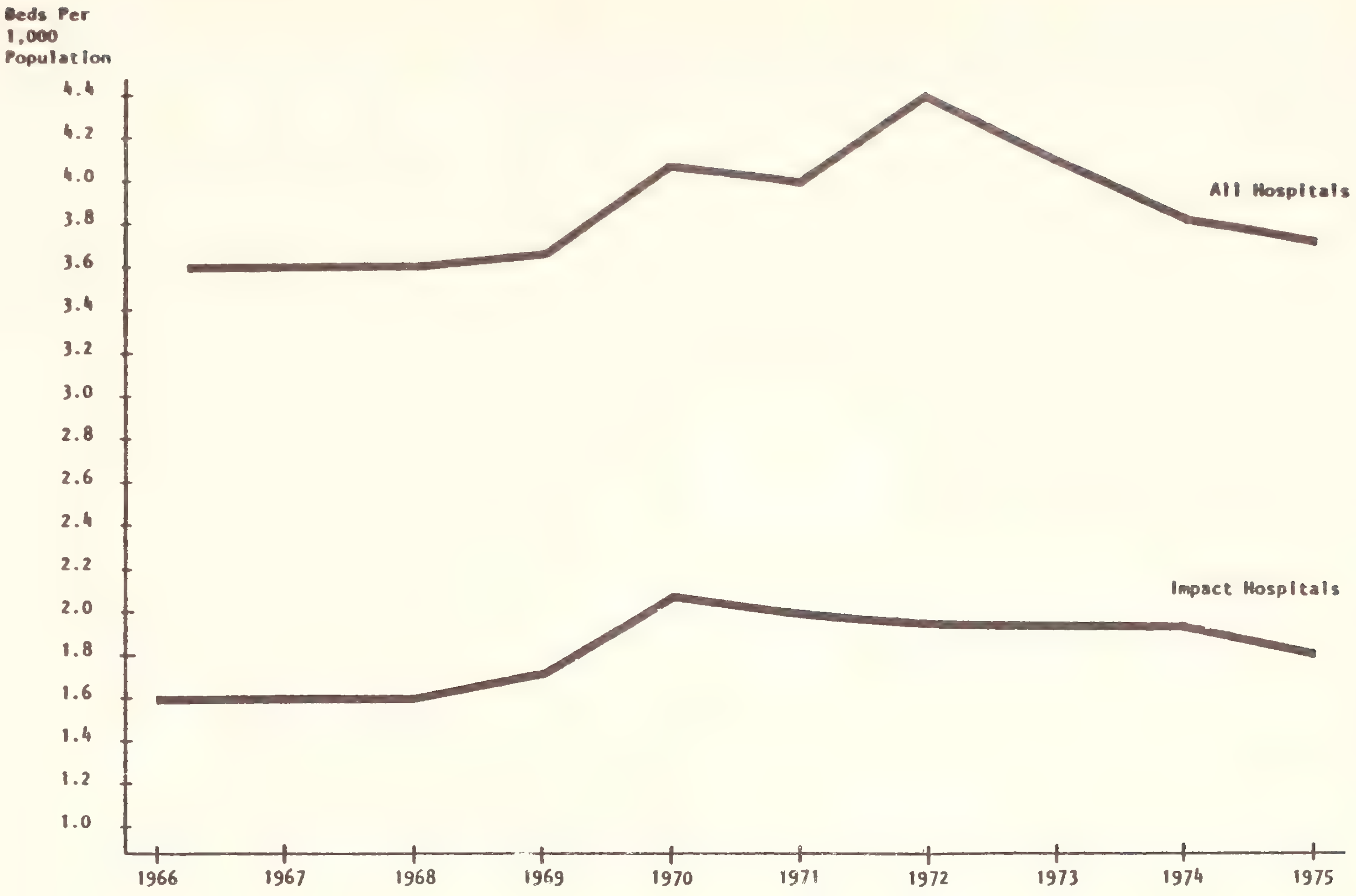

Exhibit II-12

Occupancy Rates at Impact and Two Other Hospitals

Hospital \ Year	1967	1968	1969	1970	1971	1972	1973	1974	1975
Good Samaritan	92.3%	91.4%	84.7%	85.6%	80.0%	81.6%	82.2%	84.7%	82.9%
St. Joseph's	86.2%	87.1%	86.6%	85.1%	84.7%	83.1%	83.8%	83.2%	83.5%
St. Luke's	86.7%	78.1%	55.6%	64.0%	62.1%	66.9%	76.5%	68.4%	81.5%
Scottsdale Memorial	77.9%	80.7%	82.5%	78.6%	74.0%	74.9%	79.6%	80.9%	80.2%
Phoenix Baptist	64.9%	68.9%	71.8%	71.3%	77.3%	81.5%	70.3%	65.0%	73.6%
Memorial	79.9%	72.8%	64.4%	60.1%	52.9%	48.7%	50.0%	54.7%	57.3%
Doctors	84.4%	72.6%	68.1%	67.8%	66.2%	67.3%	67.3%	69.2%	68.4%
John C. Lincoln	73.6%	75.7%	91.7%	85.6%	67.6%	69.5%	81.7%	79.9%	79.8%
Total Impact Hospitals	85.6%	83.5%	79.9%	77.7%	75.6%	77.1%	78.0%	78.3%	80.8%
Impact & Two Other Hospitals	85.8%	82.5%	82.9%	77.8%	74.1%	75.7%	76.3%	75.7%	78.6%

Sources: Data from individual institutions execpt for Doctors and John C. Lincoln Hospitals for which data were obtained from Medicare Cost Reports.

Exhibit II-13

Surgery, Non-Surgery, and Total Inpatient Days at Impact Institutions Per 1000 Population in Maricopa County, 1968-1975

Year / Inpatient Day Category	1968	1969	1970	1971	1972	1973	1974	1975
Surgery Inpatient	24.5	24.8	26.7	25.8	25.5	25.0	24.1	22.9
Non-Surgery Inpatient	19.8	25.5	24.6	31.1	27.4	24.6	25.1	27.9
TOTAL Inpatient	44.3	50.3	51.3	56.9	52.9	49.6	49.2	50.8

III. EVALUATION OF THE COST OF SURGERY PERFORMED IN ALTERNATIVE SURGICAL SETTINGS

PURPOSE AND OBJECTIVES

This chapter presents our analysis of the cost of performing surgery in the freestanding ambulatory surgical center (FSASC) setting as compared to costs in other settings. It is divided into six parts. The first part introduces the chapter and discusses the purpose and objectives of the cost analysis. The next section discusses the substantive and methodological issues involved in performing the analysis. The third section presents a brief summary of the cost analysis methodology, with a more complete version contained in the Appendix. The fourth, fifth, and sixth sections present the results of the cost analysis: section four concentrates on basic institutional policies and practices affecting costs, section five on the comparative costs of different procedures, and section six on Medicare program costs.

Project Objectives

The overall objective of the cost analysis is to compare the costs of performing surgery in alternative surgical settings, utilizing primarily the comparative costs of twelve selected surgical procedures. The primary focus is on the total cost of a surgical episode, including both direct and indirect service costs as well as the opportunity costs of having a procedure performed. Additional project objectives include the following:

- Comparison of the individual components--both direct and indirect--of service costs

- Comparison of costs by surgical phase and cost element (these are delineated in the sections that follow)
- Comparison of facility charges and their relationship to costs
- Determination of Medicare program costs for surgical facilities in alternative surgical settings.

These objectives are addressed in the sections that follow.

ANALYTICAL ISSUES AND LIMITATIONS

Introduction

In this section, several analytical issues and limitations related to assessing the costs of surgery in alternative surgical settings are discussed. These issues affected both the design of the evaluation methodology and the interpretation of the analytical findings. In addition, the issues illustrate some of the major analytical problems in assessing the costs of a broadly defined surgical episode. Two sets of issues are included. The first set is primarily concerned with the conceptual approach to the analysis of surgical costs. These issues are:

- Elements of surgical costs
- Distinction between facility-related costs and non-facility related costs
- Differences in patterns of care and implications for costs
- Differences in patient populations by surgical setting and implications for costs.

The second set of issues is related to the study methodology. This set focusses on the methodological limitations and problems encountered in the study of the costs of surgery and includes:

- Use of charges as proxy measures for the cost of physician, laboratory and radiological services.

- Difficulty in computing monetary values for opportunity costs
- Problems in the allocation of indirect costs in hospitals between inpatient and outpatient cost centers
- Limited nature of the sample.

Elements of Surgical Costs. For the purposes of this analysis, the surgical episode was broadly defined to include five surgical phases. These phases, discussed in greater detail below and in the Appendix, are screening, pre-operative, operative, post-operative, and recuperative. Because of this broad definition, the surgical episode includes several cost generating factors that are both directly and indirectly related to the surgical episode. Therefore, there is a wide variety of elements of surgical costs related to the surgical episodes included in the analysis.

The two most basic types of costs examined in the analysis are service cost and opportunity cost. As discussed in the next section dealing with methodology, the service costs include all of the direct and indirect costs incurred in obtaining the surgical service. The opportunity cost is the time and monetary value lost from being unable to pursue regular daily activities during the surgical episode.

The service cost is the source of the majority of the costs incurred during the surgical episode. Service cost is made up of two components: direct and indirect costs. The major sources of direct service cost included in the analysis were:

- Professional Cost (surgeon, anesthesiologist)
- Laboratory Cost
- Radiology Cost
- Pathology Cost
- Supplies Cost

- Medications Cost
- Labor Cost
- Travel/Transportation Cost
- Miscellaneous Cost.

These direct costs may be incurred by either the provider, the patient, the patient's insurance or other third party payment source, or the patient's family. The indirect costs are the component of the facility cost that are not related to a specific patient but are allocated across all patients as a proportion of direct cost. Indirect costs include all facility overhead costs--such items as administrative expense, medical records expense, and depreciation.

The sources of opportunity costs include time lost from routine activities and foregone revenues. However, as discussed in the methodology section, it is extremely difficult to place a dollar value on a patient's time when the patient's routine activities are not income-producing.

Distinction Between Facility-Related Costs and Non-Facility-Related Costs. An important distinction in the analysis is between the costs that are facility-related and costs that are not facility-related. The evaluation is focused, of course, on the Freestanding Ambulatory Surgical Center as a new type of health care institution for the provision of surgical services. Because services are provided on an ambulatory basis in the freestanding ambulatory surgical center setting and the patient does not stay overnight at the facility either prior to or after the surgery, it is evident that those specific costs associated wth the surgical episode incurred by the facility will be substantially less in comparison to the inpatient surgical setting. However, it is possible that the reduction in facility-related cost may be offset by an increase in non-facility-related costs for ambulatory patients. Among the alternative ambulatory surgical settings--traditional hospital outpatient, hospital affiliated ambulatory surgical center, and freestanding ambulatory surgical center--it is also likely that the costs incurred by the facility may differ because of differences in personnel costs, supplies costs, overhead expenses and policies towards laboratory tests and radiology examinations for surgical patients. However, what is a facility-related cost in one surgical setting may be a non-facility-related cost in another surgical setting. For example, for surgeries performed in the hospital inpatient setting the follow-up care for the day, or days, after surgery is a facility related cost in that the care is provided by the hospital nursing staff with patients in the hospital wards. However, for patients who have surgery in an ambulatory setting, the follow-up care, if required, may be provided at the patient's home, at a relative's or friend's home, or at a convalescence facility. In this case the services may be performed by the patient himself, by family members or friends, or by a professional or non-professional hired temporarily by the patient.

Therefore, in consideration of the fact that what is included as a facility cost may differ substantially by surgical setting, it was decided to include both facility-related and non-facility-related costs in the analysis of total surgical costs.

Differences in Patterns of Care and Implications for Costs. Even within the same medical community such as Phoenix, the pattern of care for surgical patients for a specific type of procedure differs substantially. The most obvious differences exist between inpatient and ambulatory surgical settings where, generally, the requirement for laboratory tests and radiology examinations for inpatients are more extensive than for ambulatory settings. Other differences may also occur. For example, for inpatients, most laboratory and radiology work is performed after the patients are admitted to the facility. In some ambulatory settings, laboratory and radiology work is done one or more days in advance of the patient's admission for surgery. For inpatients undergoing surgery, the length of stay in the post-operative phase--or recovery room--may be shorter than for patients who are not staying overnight in the hospitals. This is because many times the inpatients are moved back to the hospital ward before they have fully recovered from the effects of the anesthetic. Ambulatory patients, however, are required to remain in the recovery room until they are in a condition to be discharged from the facility in the company of an adult.

Because the nature of the surgical facility services provided in a particular phase will change by type of surgical setting, the cost by phase will also differ. Therefore, it is important in the analysis to identify cost by type of service as well as by phase and in aggregate; these categories are broken out in the analyses presented below.

Differences in Patient Populations by Surgical Setting and Implications for Cost. The evaluation effort presented in this report was conducted almost five years after the freestanding ambulatory surgical center was opened in Phoenix, Arizona. As documented in detail in the impact evaluation chapter, the period 1970 to 1975 saw a major shift in the distribution of surgeries among alternative surgical settings. Perhaps the most significant shift was between hospital inpatient and outpatient surgical settings. By the time this evaluation was undertaken, it is likely that the majority of minor surgeries had shifted out of hospital inpatient settings to ambulatory settings.

The types of patients that continued to have minor surgeries performed in inpatient settings may be expected to be medically and demographically different from ambulatory patients. Patients in inpatient surgical settings may be higher risk patients for surgery due to age, pre-existing conditions, or medication requirements than ambulatory patients. It is likely that surgical inpatients even for minor surgery may require a higher intensity of services or care (and therefore incur a higher cost) than patients treated in ambulatory settings. Because it was, of course, not possible to randomly assign patients to surgical settings, the findings related to costs were interpreted carefully with respect to the characteristics of the specific patient populations for each surgical center.

Methodological Issues

Use of Charges as Proxy Measures for the Cost of Physician, Labortory and Radiological Services. The purpose of the analysis is to identify the costs of the surgical episode. Although costs were the principal focus, it was necessary in some instances to use charges as a proxy for costs. In some cases, charges are the same as costs when viewed from the perspective of the patient.

Generally, for all non-facility-related costs, the charge to the patient was the primary measure of cost. When viewed from the patient's perspective, these charges are also the patient's costs which may or may not be reimbursed by a third party. For facility-related costs, however, the cost to the facility for producing the service was generally used as the measure. In some instances, including laboratory and radiology, standard charges were used to provide a proxy measure of costs. The reason for avoiding the use of charges wherever possible for facility-related services was the potential lack of a direct relationship between costs and charges in health care institutions. Cross-subsidization of hospital services and departments--either intentional or unintentional--may result in a distorted charge schedule for certain services. Therefore, the analysis focused on costs for facility-related services where possible and on charges for non-facility related services, such as the physicians' professional fee, where it would have been impossible to cost out specific items.

Difficulty in Computing Monetary Values for Opportunity Costs

The concept of opportunity costs includes the value of alternative investments of time and resources as well as the foregone revenues as a result of a selected course of action. In practice, to operationalize this concept requires detailed knowledge of the capabilities and earning potential of the individual patient included in the analysis.

If the patients are employed and the income levels and insurance characteristics are known, the foregone revenues analysis is relatively staightforward. However, because of the types of procedures that are frequently performed on an ambulatory basis and are included in the sample, a relatively large number of sampled patients were women or children. The majority of the women included in the sample--according to their responses to our questionnaire--were not employed outside of the home. The problems in imputing a wage for women who are not employed in income-producing occupations and for children or young adults are substantial and were avoided for the purposes of this analysis. The major issue in the analysis was the amount of time spent by the patients in obtaining services and the amount of time spent in recuperation from the surgery. Therefore, the analysis focused on the time spent by the patient in each phase of the surgical episode.

Problems in the Allocation of Indirect Costs in Hospitals Between Inpatient and Outpatient Cost Centers. The allocation of indirect, or overhead costs, has always been of particular difficulty for hospitals. Although the step down methodology used with the Medicare Cost Report is an attempt to standardize the general allocation process, the hospital has considerable flexibility in the allocation of indirect costs to outpatient cost centers. The major question is what is an equitable allocation that reflects the actual overhead expenses incurred as a result of the operation of the outpatient department. Many hospitals allocate on the basis of square feet of space which may over-allocate indirect costs to the outpatient department. For outpatient surgery performed in the traditional hospital outpatient setting, the main hospital operating rooms and recovery rooms are used. Therefore, it was not felt that a separate allocation for inpatient and outpatient departments was justified. For hospital affiliated ambulatory surgical centers, however, a separate indirect cost rate was utilized because both the physical space and the functions could be readily distinguished from the inpatient surgery service.

Limited Nature of the Sample. For the evaluation, it was necessary to focus on a limited number of surgical procedures performed in a limited number of surgical facilities in the Phoenix area. Because of the intensive nature of the data collection which required following individual patients and reviewing medical records, the overall sample size was also kept small--approximately 900 patients. Influencing both the selection of institutions and patients was the fact that with the exception of the freestanding ambulatory surgical center, the institutions in the Phoenix area were under no obligation to participate in the study. In addition, because the information to be reviewed was confidential, patient cooperation was also voluntary. These two limiting factors made the data collection an often arduous task and reduced considerably the size of the patient sample on which the analysis is based.

SUMMARY OF THE COST STUDY METHODOLOGY

This section concisely summarizes the study design and data collection methodology for the cost analysis. A more detailed discussion of the methodology is presented in the Appendix. This summary contains six major sections:

- Selection of surgical setting
- Selection of institutions
- Specification of surgical episode phases
- Selection of specific surgical procedures
- Selection of patients for the study
- Cost data collection methodology.

Selection of Surgical Settings

The concept of the surgical setting was the basis of the overall study design. The objective of the study effort was to investigate and compare the practice of surgery in each cognizant setting to determine if, for a comparable set of surgical procedures, differences in cost could be detected.

Based on initial information about surgeries performed in the Phoenix area, the following five surgical settings were identified (this taxonomy is uniform throughout the quality and impact evaluations, as well):

- Hospital Inpatient (IP)
- Traditional Hospital Outpatient (OP)
- Hospital-affiliated Ambulatory Surgical Center (HAASC)
- Freestanding Ambulatory Surgical Center (FSASC)
- Physician Office.

Detailed definitions of each setting are presented in the Appendix.

Selection of Institutions

Only one institution, the Surgicenter, was required to participate in the study. For the other principal institutions in the Phoenix area, a detailed briefing was presented to facility administrators. From this process, six additional suitable facilities that performed--together with Surgicenter--about 51.4% of the surgeries performed in Maricopa County in 1975 were included in the final data collection effort. These facilities included those incorporating each of the five surgical settings--except physician offices--within their institutions. Although efforts were made to elicit the assistance of Phoenix physicians, it proved to be impossible to obtain their permission for review of patient records or observation of surgeries, and therefore this aspect of the study was modified to include only a limited set of in-depth interviews with cooperating physicians.

Specification of Surgical Episode Phases

In order to investigate differences in surgical cost by each phase of the procedure, the following categories were developed to encompass the entire activity of the patient during a surgical episode:

- Screening
- Pre-operative
- Operative
- Post-operative
- Recuperation.

These are defined and explained in detail in the Appendix.

Selection of Specific Surgical Procedures

Since a very large number of surgical procedures may be performed in an ambulatory setting, to assure maximum comparability a subset of these was selected by the project staff with the assistance of an expert consultant and the government project staff. The criteria used in the selection process were frequency of performance in alternative settings, representation of surgical specialties, representation of Medicare patients, and usefulness for quality evaluation. The twelve procedures selected were:

- Myringotomy with Tubes and Adenoidectomy
- Tonsillectomy and Adenoidectomy
- Dilation and Curettage
- Laparoscopy with Bilateral Tubal Coagulation
- Inguinal Herniorrhaphy
- Excision of Breast Mass
- Excision of Ganglion
- Vasectomy
- Circumcision
- Augmentation Mammoplasty
- Eye Muscle Operation
- Excision of Lipoma or Sebaceous Cyst.

Selection of Patients for the Study

Considerations of Matching Patients by Setting.

Patients selected for participation in the study were not matched according to their demographic or surgical characteristics. Although consideration was given to matching, it was concluded that matching would have greatly reduced the feasible sample size and also would have obscured any systematic differences among patient populations undergoing different procedures and/or utilizing different settings. Therefore, patients were selected at random from those undergoing surgery at participating institutions on the days on which data collection was scheduled, subject to cost and efficiency constraints of the observation process.

Sample Size Determination. In designing the patient sampling frame, a compromise was reached between the ideal sample sizes possible within the limited project resources and the practical considerations of the anticipated volume of each procedure across each surgical setting and the expected degree of facility cooperation. Thus a 4-by-12 cell matrix was constructed with target sample sizes for each of the feasible surgical settings (not including physicians' offices) and each of the 12 procedures. The design goal was to include 1,125 patients in the sample. To achieve this, 1,345 patients were approached since we anticipated approximately an 85% completion rate. Instead, 67%, or 900, were successfully completed, with the remainder of the patients either refusing, their scheduled procedures cancelled, or the required procedures and settings not being available. The latter situation in particular posed a problem, since some procedures (e.g., vasectomies, circumcisions, excisions of lipoma or sebaceous cysts) were only rarely performed in inpatient or traditional hospital outpatient facilities. At the outset of the study, it was anticipated that not all of the cells would obtain the ideal number of procedures. Also, to an unexpected extent, the location of certain surgery procedures shifted from the IP and OP settings to the FSASC and HAASC settings. Nevertheless, many of the cells attained their design goals. More detail on the sample size in each cell is contained in the Appendix.

Data Collection Scheduling. The major portion of the data collection effort required the direct observation of patients and personnel during the surgical episode at the facility. To do this, two teams of registered nurse observers were recruited and trained. These teams coordinated with the surgical scheduling departments of each facility to obtain in an efficient manner a distribution of procedures across surgical settings. Counts were maintained of those patients refusing to cooperate, as well as of those procedures scheduled to be obseved that were then cancelled.

Cost Data Collection Methodology

The cost data collection methodology consisted of two major components:

- Resource Utilization Studies
- Cost Identification Studies.

Each of these is summarized in the following sections.

Resource Utilization Studies. The purpose of the resource utilization studies was to determine the type and quantities of all the inputs to the surgical process for each patient included in the study.

Labor Resource Inputs - In order to determine the labor inputs as specifically as possible, three interrelated data collection activities were undertaken.

Patient Study - The patient study used a combination of work sampling and continuous observation techniques to determine what categories of personnel were directly providing service to the patient during the pre-operative, operative, and post-operative phases of the surgical episode and for what length of time. (The personnel categories are listed in the Appendix.) For the pre-operative and post-operative phases, observations were made at random intervals of time between two and five minutes for the total period of time the patient was in the phase of care. Estimates were made of the amount of time spent by each category of personnel in direct care of the patient. For the operative phase a continuous observation technique was employed to record the type and duration of all personnel in the operating room during the time the patient was in the operating room.

In addition to the direct time study in the post-operative phase, at each observation interval in the post-operative phase the number and type of personnel present in the recovery room but not with a particular patient was recorded, as was the total number of patients in the recovery room. Therefore, estimates of the average number of personnel per patient in an "on-call" status during any part of the day in the recovery room were made.

Personnel Study - A personnel study was conducted for all pre-operative, operative, and post-operative personnel in the facility who provide patient care. The personnel study differs from the patient study in that its purpose was to determine the distribution of personnel active and inactive or unavailable time. The estimate of inactive time was then allocated across all patients in the facility.

Time Task Study - The time task study was conducted to estimate for a list of tasks associated with surgical procedures the amount and type of personnel time required. The tasks were selected because they are associated with every procedure and are performed in the absence of a patient.

Supplies Resource Inputs - Supplies used in the perfomance of a surgical procedure were inventoried in detail. In each facility participating in the study, the head nurse of the operating room area was interviewed. For each of the surgical procedures included in the evaluation a comprehensive list of the types and quantities of all disposable and reusable supplies was developed. The completeness of the list was verified by direct observation of the use of the supplies during the surgical episode. These supplies were designated as the "standard" supplies.

Non-standard surgical supplies were identified from the medical records of the patients included in the study. However, the use of non-standard supplies was infrequent for the surgical procedures included in the study.

Medications and Anesthetic Agents Resource Inputs - The medical record of each patient included in the study was carefully reviewed to determine all medications and anesthetic agents used in the surgical procedure. Type, quantity and the phase in which the medication was given to the patient were noted. It was not possible in the evauation to record the quantities of anesthetic agents used in the individual surgical procedures. Notations on the medical records were insufficient to allow for an accurate calculation and it was not feasible to attach flow meters to the anesthetic containers to measure directly the anesthesia resources consumed.

Support Service Resource Inputs - Support service inputs to the surgical episode were inventoried from the medical record. All laboratory tests and radiology services provided by the facility for each patient were recorded. The presence or absence of pathology services was also recorded.

Miscellaneous Resource Inputs - Miscellaneous services and resources were identified by a comprehensive, face to face, patient interview which was conducted by a registered nurse one to three months after the surgery was performed.

As a result of the activities undertaken in the resource utilization study, the types of resources consumed or used by each patient in the study was identified and the quantities of resources were specified.

Cost Identification Studies. The cost identification studies sought to identify or estimate three major types of surgical episodes related costs.

- Direct Costs
- Indirect Costs
- Opportunity Costs.

In this section the methods employed to collect the data required for the analysis of costs are summarized.

Direct Costs - Direct costs consisted of three major categories: direct labor, direct supplies, and direct medications and materials. Each cost category is discussed below.

Direct Labor - Direct labor is the time of professional and paraprofessional staff devoted to the conduct of each phase of each surgical procedure under study. By use of the work sampling portion of the industrial engineering study, actual time expended by the various professional and paraprofessional categories of personnel was determined, by phase, for each of the types of procedures.

Collection of Direct Labor Rates - It was necessary to collect sufficient data on each facility category rate to allow for computation of a category labor rate. In general, this required that substantial data, including total salaries, hours expended, etc., be collected for each category.

Computation of Category Rates - In most cases, determination of salary rates in both freestanding and hospital-affiliated ambulatory surgical centers was straightforward. Because there were not any patients remaining overnight, all time worked was in essence, "straight time". That is, no shift differentials, overtime, or premium pay was included in labor rates. In the case of inpatient surgical facilities, however, such differentials did exist, and an adjustment in labor rates was made in order to compensate for this factor.

To summarize, then, salary rates derived or computed from the cost data collection effort were, when possible, based on actual payroll data; exclusive of fringe benefit costs; adjusted to compensate for shift differential and other forms of premium pay; and categorized in project categories which were comparable from facility to facility.

Direct Supplies - Direct supplies included all items of a disposable nature which are (1) provided on a physical unit basis and (2) which are consumed in the course of each phase of a given procedure. This typically included such items for external application as bandages and sutures, disposable blades and syringes, cautery tools, gowns, sheets, drapes, surgeon's gloves, and other like items. Typically, these items are bought in bulk, and dispensed on a unit basis for use in procedures. Generally, they are dispensed in one of two manners. They may be prepared as a "standard pack" for each phase of a procedure. The second way in which items may be dispensed is on a "non-standard" basis. That is, items will be drawn from supply as needed. In any event, the key characteristics of direct materials are (1) their use in physically discrete units, i.e., one bandage, one gown; and (2) their disposable (one time use) nature. One category of supplies was specifically difficult in terms of inclusion or exclusion from direct supplies. These included items of limited durability, such as cloth gown and sheets and similar materials which are typically expended or consumed within one year. An inventory item costing procedure was developed that used procurement records to determine the actual item cost to each facility.

Direct Medications and Materials - All items classified as direct materials were classified as "non-standard". That is, there was no "standard pack", or similar grouping of items, which were consistently used as direct materials for a given procedure. Rather, direct materials consisted of those medications and like materials drawn from bulk supplies on a case-by-case basis. For items in this category, inventory records or supplier invoices were used to provide unit costs.

Indirect Costs - The basis of allocation of indirect costs was the percentage of computed direct labor costs. Total indirect costs applicable to a given surgical unit for the most recently completed fiscal period was obtained, and compared to direct labor costs applicable in the same period, in order to calculate a percentage relationship. This percentage relationship was then applied to actual direct labor costs observed by phase of a specific procedure, all direct and indirect costs calculated, and a total procedure cost determined. All indirect allocation cost plans and policies used by particular facilities were accepted at face value. The only major concern was that accurate statements of total amounts of direct labor and indirect costs are available in order to determine the percentage relationship. Determination of indirect cost ratios involved four basic steps. These were:

- Obtaining facility allocation plans and documentation
- Comparison of actual accounting data to the allocation plan to determine any discrepancies or needs for adjustment
- Adjustment of accounting data to ensure consistency of approach between facilities
- Application of indirect costs, by phase for each procedure.

There are two key areas of information in indirect cost allocation. These are:

- The general policy of a facility relative to indirect cost allocation

- Accounting data illustrating actual allocations for the most recently completed fiscal period.

The allocation method used in the study was the method used for the internal management of the facility, which was reviewed in conjunction with the Medicare Cost Reports, particularly when this served as the basis used for audited financial statements. This overall procedure worked well for most of the facilities included in the study. Further details of the procedures used are contained in the Appendix.

Opportunity Costs - For the purposes of the evaluation, opportunity cost was measured in terms of foregone revenues of patients that were reported for patients who were employed, and in terms of the amount of time the patient was unable to perform his or her normal activity during each phase of the surgical episode.

The medical record and direct observations by the study team served as the primary source of time information for the pre-operative, operative, and post-operative phases of care. The patient interview was used to collect time estimates from the patient for the screening and recuperative phases of care. The information requested from the patient was as follows:

- Milestone dates and times that marked the beginning and end of the surgical care phases
- Time spent in obtaining diagnostic and treatment services during each phase of care
- Length of time in recuperation before the patient resumes normal activity
- Amount of revenues foregone by the patient as a result of the surgical episode

Although patient income information was collected in the patient interview, no attempt was made to estimate the cost of the alternative use of the patients' time in the absence of specific information on foregone revenue. The patients in the sample included a large proportion of women not in the labor market and children, which would further complicate the calculation of opportunity cost because of the difficulties in ascribing a specific value to the time of these patients.

BASIC POLICIES AND PRACTICES AFFECTING COSTS

In this section, the primary institutional policies and practices affecting the costs of surgical services are described for the four institutional-based surgical settings included in the study. This analysis serves as an introduction to the detailed procedure-specific analysis of costs in alternative surgical settings presented in the next major section of this chapter.

The focus of this analysis was on the cost implications of the basic differences between the surgical settings and their approaches to patient care. Although the cost issues were included in this analysis, the differences in patient care policies and treatment characteristics are presented in detail in Chapter IV, Evaluation of the Quality of Surgical Care in Alternative Surgical Settings.

In this section of the cost evaluation, three analyses were included:

- Analysis of institutional policy affecting cost
- Analysis of staffing utilization
- Allocation of Indirect Costs.

Analysis of Institutional Policy

For the minor surgical procedures included in the study, the surgical episode for patients across the surgical settings included in the study, with only minor exceptions, was not particularly complex. Although some patients, because of age or pre-existing conditions required more nursing care or had a greater number of laboratory tests performed, these circumstances did not occur frequently. The most significant differences in institutional policy between surgical settings was the obvious one--the requirement for patients admitted to the IP setting to spend one or more nights in the hospital prior to and after the surgery incurring a per diem cost for the use of a bed in a general nursing ward.

Policies Regarding Patient Admission and Discharge. For all of the procedures observed in the IP setting, the patient was admitted to the inpatient facility the afternoon or evening of the day prior to the scheduled surgery. This characteristic, of course, served to differentiate the IP setting from the ambulatory settings included in the study. Although, during this overnight stay which occurred in the pre-operative phase the patient had the required or requested clinical laboratory tests, radiology examinations, and physical examination performed, the cost of these activities was relatively minor compared to the cost incurred as a result of the overnight stay on the nursing ward. In the ambulatory settings, many of the same or similar preoperative phase activities were also performed. However, they were either completed in a separate visit to the facility or hospital laboratory prior to the day of surgery or immediately after admission to the facility on the scheduled day of surgery. In either case, in the ambulatory surgical settings the costs, both direct and indirect, of an overnight stay on the nursing ward were not incurred.

The same considerations were apparent in the recuperative phase after the patient was discharged from the recovery room. In the ambulatory settings, patients were generally discharged from the recovery room to home for the recuperation period, whereas patients in the IP setting were generally returned to the nursing ward for another overnight stay in the hospital. However, for two procedures included in the study, the patient in the ambulatory setting was not discharged directly to home from the recovery room. For patients undergoing the augmentation mammoplasty procedure (in one of the HAASCs and in the FSASC) the patient was usually discharged from the recovery room and sent by ambulance to a convalescent care faciltity for an overnight stay--thus incurring an additional charge of $60.00. For tonsillectomy and adenoidectomy patients one of the HAASC settings included in the study had a special policy that generally required the patient to be sent from the recovery room to the inpatient hospital for observation--thus incurring the costs of an overnight stay on the nursing ward. For the IP setting, however, all patients included in the study remained in the inpatient hospital for at least one overnight stay after the surgery.

Although exceptions were noted for augmentation mammoplasty patients in ambulatory settings and for tonsillectomy and adenoidectomy patients in one HAASC setting, it was the general nursing ward time incurred in the preoperative and recuperative phases of the surgical episode that had the greatest implications for the differences in the total costs of the surgical episode between IP and ambulatory settings. The impact of the overnight stay in the hospital and its associated costs may be seen in Exhibit III-1 which presents the direct and indirect general nursing ward costs per patient day for the six inpatient facilities in the study. Although there was some variation observed among facilities--most notably in the direct labor cost per day for Facility #6, as compared to the other institutions--the cost impact of a two day stay in the hospital, in terms of general nursing ward costs, is readily seen. For the facilities included in the study, the additional cost for a two-day stay would range from $128.86 in Facility #2 to $183.80 for Facility #6. It is interesting to note that the total direct cost per patient day was found to be considerably higher in Facilities #4 and #6 then in the other facilities. Both of these facilities are government owned. One is a large county-operated facilitiy that serves primarily the medically indigent and welfare populations in Maricopa County. The second facility is a state-owned hospital that specializes in the care and treatment of crippled children from throughout the state. In the latter case, the apparently higher direct nursing labor cost per patient day may be attributable to the special needs of the patients treated in the facility. However, the high direct labor costs per patient day in the other government owned facility is not readily explainable. It should be noted however, that the indirect costs per patient day for these two facilities are less than the indirect costs for the other inpatient facilities, in part offsetting the observed higher direct costs and indicating that the higher direct costs may partially be attributable to differences in allocation procedures between government owned and non-government owned facilities. As may be seen from the exhibit, the total cost per patient day for five of the facilities were similar (within eleven dollars per day or 17% of one another). Only Facility #6, the children's hospital, had a substantially higher total cost per patient day which was 42.6% higher than the lowest cost facility included in the study.

Exhibit III-1

Direct and indirect General Nursing Ward Costs Per Patient Day For Six Facilities, 1974 - 1975

INPATIENT FACILITY GENERAL NURSING WARD PER DAY COST	#1	#2	#3	#4	#5	#6
Direct Labor	$21.55	$26.66	$23.89	$37.62	$22.11	$51.42
Direct Supplies, Other	5.73	.71	1.26	1.16	.75	5.10
Subtotal	27.28	27.37	25.15	38.78	22.86	56.52
Indirect	41.81	37.06	50.17	32.35	41.79	35.38
Total	69.09	64.43	75.32	71.13	64.65	91.90

Source: Hospital Accounting Records Medicare Cost Reports

Policies Regarding Laboratory Tests, Radiology Exams, and Medications. Differences in the patient care policies among surgical settings with regard to laboratory tests, radiology examinations, and medications substantially affected the cost of surgical services. As discussed in detail in the quality of care assessment presented in the next chapter, the FSASC setting performed the fewest clinical laboratory tests of any surgical setting included in the study. In the FSASC setting, only a dipstick urinalysis and a hemoglobin test were routinely performed. In the HAASC settings the laboratory work was somewhat more extensive with one HAASC requiring a complete blood count and dipstick urinalysis and the other HAASC requiring a hematocrit, white blood cell count, rapid plasma reagent and dipstick urinalysis. As performed at the FSASC, the hemoglobin and dipstick urinalysis test had a minimal, almost insignificant cost. The small laboratory is adjacent to the preoperative holding area and a registered nurse immediately performed the tests for several patients at one time requiring only one or two minutes per patient with a negligible supplies cost. In the HAASC settings, however, the tests were performed in the hospital laboratory. For one HAASC the tests were performed in a hospital-owned laboratory that primarily provided services to surgical outpatients and physician's offices located in the building. Charges were used as proxy measures of the costs of individual laboratory tests. Although it would have been preferable to use the resource cost of the tests, it was beyond the scope of the project to conduct the required industrial engineering study in the laboratory departments of the facilities included in the evaluation. It is recognized that charges may be poor estimates of costs because of conditions in facility pricing structures and the differences in facility overhead allocation policies. Exhibit III-2 presents a comparison of the charges for the routine laboratory tests performed at the two HAASC settings included in the study. No comparable charge data were available for the FSASC setting because no separate charge was made for laboratory tests performed in the facility. However, if the average laboratory test charges across all facilities included in the study are computed for the hemoglobin and dipstick urinalysis tests performed at the FSASC setting, the approximate comparable charge would be $7.98 ($2.83 for the hemoglobin test and $5.15 for the dipstick urinalysis). Using this estimate for the FSASC setting, the charge for routine laboratory services in HAASC #1 is 87% higher and 138% higher for HAASC #2 than the estimated charge at the FSASC.

Exhibit III-2

Charges For Routine Clinical Laboratory Tests In Two HAASC Surgical Settings: 1975-1976

SURGICAL SETTING / LABORATORY TEST	HAASC #1	HAASC #2
Hemoglobin	Not Routine	Included in CBC
Hematocrit	$ 2.65	Included in CBC
White Blood Cell Count	2.65	Included in CBC
Differential	Not Routine	$ 6.25
Complete Blood Count	Not Routine	7.75
Rapid Plasma Reagent	4.35	Not Routine
Urinalysis (Dipstick)	5.30	5.00
Total	$14.95	$19.00

Source: Hospital Laboratory Departments

In the OP and IP settings the clinical laboratory tests performed varied considerably. However, the most frequently performed tests in these settings included urinalysis (dipstick and microscopic), complete blood count with differential, and rapid plasma reagent (or equivalent screening test for venereal disease). The charge by facility for these tests is given in Exhibit III-3. The charge for the set of tests was relatively consistent across facilities, ranging from $20.56 to $28.00. Substantial variation was noted, however, for specific tests including: complete blood count where the charge in the most expensive facility was more than double the facility with the lowest charge; differential which ranged in charge from $1.50 to $6.50; and for dipstick urinalysis which ranged from $1.15 to $5.30 in the facilities included in the study.

The arrangements for pathology services were also found to have a significant impact on the cost of surgical services. The FSASC sends tissue specimens at the option of the physician to an independent laboratory which then bills the FSASC for the service and the FSASC then passes the charge for the service on to the patient. Again, it was not possible to determine the actual cost of the pathology examination; however, the difference in the charges among surgical settings and facilities is very revealing. Exhibit III-4 shows the pathology charges for a gross and microscopic examination of tissue as well as for a frozen section for the FSASC setting and the six other hospital-based settings. It is evident from the charges in the hospital based settings that the charges for microscopic tissue examination were considerably higher than the charges made in conjunction with the FSASC setting, which contributed to a major difference in overall cost for some procedures as seen in the procedure specific cost analysis.

Radiology examination is another area where the policies and practices of the institutions may affect the surgical cost. In the ambulatory settings, X-rays were generally not performed although all facilities had the capability if required. However, in the IP setting a one or two view chest X-ray was usually taken. As shown in Exhibit III-5, this cost may be a substantial contribution to the total procedure cost. The charge for X-rays was used as a proxy for the cost of the service. Although the FSASC setting has the capability to perform chest X-rays, they were not found to be required. According to statements made by facility representatives if a physician requested an X-ray it would be taken; however, no charge would be made for this service.

Exhibit III-3

Charges for Selected Laboratory Tests for Six Hospitals: 1975-1976

TEST \ INPATIENT/ OUTPATIENT FACILITY	#1	#2	#3	#4	#5	#6
Rapid Plasma Reagent	$ 5.45	$ 4.05	$ 4.35	$ 4.77	$ 5.00	$ 5.00
Complete Blood Count	13.50	8.10	7.25	6.00	7.75	7.00
Differential	3.20	3.32 2/	2.65	1.50	6.25	3.00
Urinalysis (Dipstick)	1.15	4.05	5.30	4.50	5.00	2.00
Urinalysis (Microscopic) 1/	3.15	3.79	4.00	3.79	4.00	4.00
TOTAL	26.45	23.31	23.55	20.56	28.00	21.00

1/Charge for Microscopic is in Addition to Dipstick Urinalysis Charge

2/Estimated Charge

Source: Hospital Laboratory Departments

Exhibit III-4

Charges for Three Types of Tissue Examination By Surgical Setting, 1975 - 1976

TISSUE EXAMINATION TYPE / SETTING FACILITY	IP/OP #1	IP/OP #2	IP/OP #3	IP/OP #4	IP/HAASC #1	IP/HAASC #2	FSASC
Pathology-Gross	$ 7.30	$ 6.75	$ 7.26	-	$ 7.25	$ 7.75	-
Pathology-Microscopic	21.80	20.25	23.70	5.00	29.05	23.70	7.50
Frozen Section	43.60	42.15	33.00	35.00	43.55	39.00	12.50

Note: The designation IP/OP #1 indicates that a single institution, with the same charge for the tests shown, had both IP and OP settings.

Source: Facility Business Offices

Exhibit III-5

Charges for One and Two View Chest X-Rays in Six Surgical Facilities, 1973-1976

SETTING-FACILITY / RADIOLOGY EXAM	IP/OP #1	IP/OP #2	IP/OP #3	IP/OP #4	IP/HAASC #1	IP/HAASC #2
Chest X-Ray (1 View)	$ 12.95	$ 15.00	$ 8.75	$ 7.00	$ 11.87	$ 11.00
Chest X-Ray (2 View)	25.90	22.50	17.50	11.00	18.78	17.50

Source: Facility Business Offices and Radiology Departments

The costs of medications used in a surgical setting were also observed to vary somewhat by type of setting although the impact on differences in total cost was not great. Facility policy and practice was important in two areas related to medications. The four voluntary hospitals in the study belonged to the Arizona Central Buying Service which is an organization of hospital facilities in the state that buys supplies and medications from manufacturers in bulk quantities and repackages and distributes the materials to the member institutions at a generally lower cost than a facility could obtain independently. Although this service cannot supply all medications, it can supply at relatively low cost many of the frequently used medications. The FSASC does not belong to the buying service and, therefore, must deal with individual suppliers and distributors for medications. The two government owned institutions purchase medications through annual contracts negotiated by the state.

The second area in which facility policy affects the costs of medications was in the use of intravenous solutions. Comparatively, IVs are expensive medications which include the bottle, tubing and needle as well as the solution itself. If a facility typically starts an IV on all patients, obviously more cost will be incurred than if IVs are started only on a selected basis. The FSASC used IVs for only selected patients and/or procedures as did one HAASC setting. The other HAASC used IVs regularly for patients in the operative and post-operative phases as did the IP settings included in the study. Exhibit III-6 presents a comparison of the costs of nine of the most frequently used medications for the settings and facilities included in the study. It may be seen that the FSASC experienced higher cost for the two IV solutions than did the other facilities in the study. The FSASC also purchased the medication phenergan at a higher cost than the other facilities. For the other most frequently used medications, the FSASC setting cost was near or below the costs of the other facilities.

Summary of Findings. The following findings may be summarized from the analysis of institutional policies affecting cost:

- The principal differences in patient care policy between the inpatient and ambulatory settings is the overnight stay component of the inpatient surgical episode. For

Exhibit III-6

Costs of Nine Selected Medications and Quantities By Surgical Facility And Setting: 1975-1976

MEDICATION / SETTING - FACILITY	IP/OP #1	IP/OP #2	IP/OP #3	IP/OP #4	IP/HAASC #1	IP/HAASC #2	FSASC
Demerol (100 mg)	$ .26	$ .09	$ .34	$ .32	$ .09	$ .35	$ .29
Atropine (.4mg)	.09	.08	.11	.11	.06	.09	.05
D5W-IV (1000 cc)	.54	.95	1.46	1.10	.95	.95	1.69
D5W/LR-IV (1000 cc)	1.16	1.17	1.75	1.35	1.17	1.17	2.01
Dramamine (50 mg)	.54	.50	-	-	.51	-	.30
Empirin #3 (Tablet)	.09	.08	-	-	-	.08	.08
Phenergan (50 mg)	.34	.32	.21	.61	.32	-	.67
Vistaril (100 mg)	1.58	1.51	1.33	1.50	1.33	1.33	1.51
Valium (10 mg)	.72	.92	.57	.94	.58	.69	.66

the facilities included in the study the cost impact of the use of a general nursing ward for two nights ranged between $128.88 to $183.80.

- As measured by charges, routine clinical laboratory services were most expensive in the IP setting, with a facility average of $23.81; less expensive in the HAASC settings with a facility average of $16.98; and least expensive in the FSASC setting where no charge was made. If a charge was made in the FSASC setting comparable with the per test charge in the other surgical facilities, the charge would be approximately $7.98. The difference in the total charges among settings may be attributed to the different mix of tests routinely performed in the settings and differences in the per test charge structure.

- The charge for microscopic pathology examination of tissue and for frozen section was found to vary substantially across facilities, especially between the FSASC setting and the hospital-based settings. The average charge for a frozen section in a hospital-based setting was $39.38 compared with $12.50 in the FSASC setting.

- Chest x-rays were found to be not routinely required in the HAASC and FSASC surgical settings. However in the IP settings and to a lesser extent in the OP setting radiology examinations were used with charges ranging from $7.00 to $12.95 for a single view chest x-ray and from $11.00 to $25.90 for a two view chest x-ray.

- The cost of medications varied somewhat among surgical facilities and setting with the FSASC setting paying more for those items which the other facilities generally purchased through the Arizona Central Buying Service such as intravenous solutions (the FSASC is not a member of the service). For other medications the FSASC purchased items near or below the cost observed for the other facilities.

Analysis of Staff Utilization

Variations in the mix of staff used in the alternative surgical settings as well as differences in the functions performed by the staff may result in differences in the cost of surgical services across settings. An analysis was conducted of the distribution of registered nurse, licensed practical nurse and operating room technician time by personnel type and by type of function to examine differences among the surgical settings and facilities included in the study. The analysis was performed separately for the operative as well as for the post-operative phases.

Exhibit III-7 shows the distribution of selected staff time in the operative phase by surgical setting for three categories of personnel: registered nurse, licensed practical nurse and operating room technician. As may be seen from the exhibit, RNs were the labor category most frequently used in the operative phase. However in all of the IP/OP settings and in one HAASC setting, O.R. technicians were also employed, ranging from 10.4% of the total personnel time in the phase to 38.1% of the time in one of the IP/OP settings. The FSASC and one HAASC setting were unique in that O.R. technicians were not used in these facilities. No LPN time was used in the operative phase.

RNs and LPNs were observed in four of the nine surgical settings-facilities included in the analysis as shown in Exhibit III-8 for the post operative phase. Technicians were not employed in patient care in the post-operative phase by any of the facilities. Neither of the two HAASCs or the FSASC setting made use of the LPN personnel category, whereas four of the six IP/OP settings used LPNs in the post-operative phase. The proportion of total time provided by LPNs in these four facility-settings varied from 21.7% to 46.3%. To the extent that RN time could be offset by LPN or O.R. technician time in either the operative or post-operative phases, the cost of labor would be lessened because of the differences between the relatively high cost of RN time and the lower cost of the O.R. technician and LPN labor categories.

Exhibit III-7

Distribution of Selected Categories of Staff Time in The Operative Phase by Personnel Type and Surgical Setting

FACILITY-SETTING / PERSONNEL TYPE	IP/OP #1		IP/OP #2		IP/OP #3		IP/OP #4		IP #5		IP #6		HAASC #1		HAASC #2		FSASC	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
RN	3480	77.2%	1111	61.9%	1299	63.5%	742	80.0%	1261	89.6%	2791	82.5%	1158	100.0%	907	84.6%	2052	100.0%
LPN	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
O.R. Technician	1026	22.7	683	38.1	746	36.5	185	20.0	147	10.4	589	17.5	0	0.0	165	15.4	0	0.0
TOTALS	4506	100.0%	1794	100.0%	2045	100.0%	927	100.0%	1408	100.0%	3380	100.0%	1158	100.0%	1072	100.0%	2052	100.0%

Source: Resource Utilization Study

Exhibit III-8

Distribution of Selected Categories of Staff Time in the Post-Operative Phase by Personnel Type and Surgical Setting

FACILITY SETTING / PERSONNEL TYPE	IP/OP #1		IP/OP #2		IP/OP #3		IP/OP #4		IP #5		IP #6		HAASC #1		HAASC #2		FSASC	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
RN	925	69.4	447	78.3	720	53.7	372	100.0	252	100.0	501	72.7	1158	100.0	749	100.0	[illegible]	[illegible]
LPN	408	30.6	124	21.7	621	46.3	0	0.0	0	0.0	188	27.3	0	0.0	0	0.0	0	[illegible]
OR Technician	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	[illegible]
TOTALS	1333	100.0%	571	100.0%	1341	100.0%	372	100.0%	252	100.0%	689	100.0	1158	100.0	749	100.0%	[illegible]	[illegible]

Source: Resource Utilization Study

The distribution of staff time by function and surgical setting is presented in Exhibits III-9 and III-10 for the operative and post-operative phases respectively. The distribution of staff time by function was not observed to vary significantly by surgical setting in the post-operative phase. In general, the ambulatory surgical settings seemed to have approximately the same proportion of staff time active with patients as the IP/OP settings. It appeared that the staffs of the Surgical centers spent a somewhat greater proportion of time in the post-operative phase in the "other active" category (24.2% to 25.9%) than did the nursing staffs in the IP/OP settings (12.7% to 17.2%). Conversely, the nursing staffs in the HAASC and FSASC settings spent proportionately less time as "on-call available" (9.9% to 14.3%) than the IP/OP settings (12.4% to 36.3%). It would appear that generally the HAASC and FSASC setting staffs in the post-operative phase were somewhat more active than staffs in the other settings. This may be due to the smaller staff complements in the ambulatory surgical center settings, increased motivation or the use of fewer aides and orderlies in these settings thus requiring more tasks to be performed by the nursing staffs.

In the operative phase, the nursing staffs in the IP/OP settings appeared to spend a greater proportion of time directly with the patients than did the staff in the HAASC and FSASC settings. It is likely that this is a result of the more complex surgical case mix in the IP setting requiring more staff per procedure in the operative phase. The HAASC with relatively low surgery volume was also observed to have a higher proportion of nursing time in the operative phase as "on-call available" (9.9%) than did any of the other surgical settings. This reflects the time lag between procedures in the setting and the use of operating room personnel in the recovery room area to observe patients. It was also noted that the HAASC and FSASC settings had a somewhat greater proportion of nursing staff time spent as "unavailable" (included time spent out of the facility as well as on breaks or at lunch in the nurses lounge) than did the IP/OP settings.

Summary of Findings. With regard to staff utilization it was found:

- All of the IP/OP facility-settings and one of the HAASC settings utilized operating room technicians between 10.4% and 38.1% of the total nursing staff time in the operative phase. The FSASC employed only RNs in both the operative and post-operative phases.

Exhibit III-9

Distribution of Nursing Staff Time in the Operative Phase By Function and Surgical Setting

Time in Minutes

FACILITY-SETTING / FUNCTION	IP/OP #1		IP/OP #2		IP/OP #3		IP/OP #4		IP #5		IP #6		HAASC #1 1/		HAASC #2		FSASC	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Active With Patient	2211	49.1%	986	55.0%	1121	54.8%	396	42.7%	562	39.9%	1202	35.6%	420	36.3%	245	22.9%	745	36.3%
Active-Special Tasks	364	8.1	286	15.9	300	14.7	59	6.4	107	7.6	399	11.8	71	6.1	115	10.7	212	10.3
Other Active	1076	23.9	245	13.7	231	11.3	214	23.1	394	28.0	1000	29.6	300	25.9	327	30.5	259	12.6
On-Call Available	11	0.2	0	0.0	0	0.0	2	0.2	25	1.8	2	0.1	114	9.9	24	2.2	5	0.2
Other Available	106	2.4	8	0.4	22	1.1	27	2.9	77	5.5	74	2.8	14	1.2	13	1.2	275	13.4
Unavailable	592	13.1	256	14.3	350	17.1	226	24.4	217	15.4	621	18.4	238	20.6	337	31.4	530	25.8
Unknown	146	3.2	13	0.7	21	1.0	3	0.3	26	1.8	82	2.4	1	0.1	11	1.0	26	1.3
TOTALS	4506	100.0%	1794	100.0%	2045	100.0%	927	100.0%	1408	100.0%	3380	100.0%	1158	100.1%	1072	99.9%	2052	99.9%

1/ Includes personnel in operative and post operative phases

Source: Resource Utilization Study

Exhibit III-10

Distribution of Nursing Staff Time in the Post Operative Phase by Function and Surgical Setting

Time in Minutes

FACILITY-SETTING	IP/OP #1		IP/OP #2		IP/OP #3		IP/OP #4		IP #5		IP #6		HAASC #1 1/		HAASC #2		FSASC	
FUNCTION	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Active With Patient	411	30.8%	260	45.5%	401	30.5%	162	43.5%	56	22.2%	193	28.0%	420	36.3%	312	41.7%	440	34.3%
Active-Special Tasks	0	0.0	0	0.0	20	1.5	12	3.2	1	0.4	0	0.0	71	6.1	5	0.7	34	2.6
Other Active	179	13.4	28	4.9	167	12.7	64	17.2	43	17.1	110	15.9	300	25.9	193	25.8	311	24.2
On-Call Available	484	36.3	137	24.0	356	27.1	46	12.4	74	29.4	232	33.7	114	9.9	98	13.1	183	14.3
Other Available	27	2.0	11	1.9	47	3.6	15	4.0	21	8.3	10	1.5	14	1.2	10	1.3	117	9.1
Unavailable	211	15.8	135	23.7	309	23.6	72	19.4	39	15.5	125	18.1	238	20.6	128	17.1	191	14.9
Unknown	21	1.6	0	0.0	13	1.0	1	0.3	18	7.1	19	2.8	1	0.1	3	0.4	8	0.6
TOTAL	1333	99.9%	571	100.0%	1341	100.0%	372	100.0%	252	100.0%	689	100.0%	1158	100.1%	749	100.1%	1284	100.0%

1/Includes personnel in operative and post operative phases

- LPNs were not used in either the HAASC or the FSASC setting. However four of the six IP/OP settings employed LPNs in the post operative phase. The proportion of total nursing time spent by LPN's ranged from 21.7% to 46.3%.

- Distribution of nursing staff time by function in the operative phase did not vary substantially across surgical settings. However, it was observed that a somewhat greater proportion of total staff time was spent directly with patients in the IP/OP setting than in the HAASC or FSASC settings, perhaps reflecting the more complex surgical case mix in the IP setting requiring more staff time per patient in the operative phase.

- In the post-operative phase the staff in the ambulatory surgical centers appeared to spend somewhat more time active in patient-related activities and less time "on-call" than in the IP/OP settings.

Allocation of Indirect Costs

This section presents data on the indirect costs incurred by the surgical facilities included in the study. It should be emphasized at this point that these costs were derived mainly to serve as an "overhead" proportion that could be applied to the direct costs of labor and supplies that were observed first hand by the observer teams. Thus, while the ability of the indirect cost data by themselves to show differences across facilities or settings is quite limited, the data are presented here to demonstrate as completely as possible the method used.

As described in the methodology section of this report, direct costs were defined as the cost of labor and supplies, materials, and medications that could be directly attributed to a surgical procedure and reported in the operating room and recovery room cost centers. Indirect costs were defined as the overhead and non-revenue producing costs, determined by the facility via the Medicare "step down" allocation and accounting procedures, to be appropriate for the operating room and recovery room cost centers. The indirect cost rate was, thus, computed as the ratio of indirect to direct costs for these two cost centers combined. Facility accounting records and Medicare Cost Reports were used to determine the distribution between direct and indirect costs for the facilities and settings included in the study.

Exhibit III-11 presents the distribution of direct and indirect cost for the operating and recovery room areas for each of the facility settings included in the study. As may be seen from the exhibit, the IP/OP settings were not separately distinguished in terms of direct and indirect cost because of the frequent use of the same hospital resources in the provision of both inpatient and outpatient surgical services. It should be noted that the costs reported in the exhibit are for twelve month periods except for IP/OP Facility Setting #4 and the FSASC setting where the distribution was based on ten months and nine months of accounting data respectively. The reporting periods were generally comparable except for IP/OP facility setting #4 where the period extended into the first and second quarters of 1976. It should also be noted that the costs in the FSASC setting did not include those costs that could be attributed to the "Pain Center" which, at the time the analysis was conducted, shared a portion of the FSASC facility. Although the data on direct and indirect costs were at a very aggregate level, several interesting observations may be made. Examination of the total costs for the IP settings showed a wide range of total facility cost for the IP settings included in the study. The highest total cost IP setting (#1) with $3,505,063 was twelve times as large as the smallest IP setting (#4) with $277,726 in total cost on an annualized basis. The two HAASC settings were smaller in total cost for the operating and recovery room cost centers than all but one of the IP settings. The FSASC, however, with a total annualized cost of over one million dollars had a considerably higher total cost than either of the HAASC settings and was also larger than three of the IP/OP facility-settings. This higher cost reflects the high surgical volume of the FSASC as compared to the other facilities, especially the HAASCs where the FSASC case load was more than twice the volume of either of the hospital based ambulatory surgical centers.

Exhibit III-11

Direct and Indirect Cost by Facility and Surgical Setting

Setting/Facility	IP/OP #1		IP/OP #2		IP/OP #3		IP/OP #4		IP #5		IP #6		HAASC #1		HAASC #2		FSASC	
Cost Category	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
Direct Costs	2,454,322	70.0	1,135,189	60.3	1,581,438	74.3	150,994	65.2	238,983	53.3	641,736	66.5	84,289	26.9	123,565	59.6	312,536	41.5
Indirect Costs	1,051,641	30.0	747,319	39.7	546,975	25.7	80,441	34.8	209,301	46.7	323,049	33.5	228,885	73.1	83,604	40.4	438,632	58.5
Total Costs	3,505,963	100.0%	1,882,508	100.0%	2,128,413	100.0%	231,435	100.0%	448,284	100.0%	964,785	100.0%	313,174	100.0%	207,169	100.0%	751,168	100.0%
Reporting Period	7/1/74 to 6/30/75		7/1/74 to 6/30/75		7/1/74 to 6/30/75		7/1/75 to 4/30/76		10/1/74 to 9/30/75		10/1/74 to 9/30/75		10/1/74 to 9/30/75		10/1/74 to 9/30/75		4/1/75 to 12/31/75	

Source: Medicare Cost Reports
Facility Accounting Records

Examination of the percent distribution of direct and indirect cost showed that only the FSASC setting and one of the HAASC settings experienced a higher proportion of total cost in allocated indirect cost than in direct cost. In the FSASC, 58.5% of all costs were indirectly allocated items. In one HAASC, 73.1% of all costs were classified as indirect. The large proportion of indirect costs for this HAASC is the result of two factors: a large depreciation allowance on the relatively new structure built expressly for the HAASC (45.0% of all indirect cost for this setting is depreciation expense); and a small direct cost base resulting from the low surgery volume of the setting during the study period. In contrast, the other HAASC setting which had a larger patient volume than the other HAASC, experienced only 40.4% of its total cost in indirect allocation items and is similar, in the proportion of indirect versus direct costs, to the other hospital based facilities. With the exception of HAASC #1 because of its low volume and high depreciation cost, the FSASC appeared to have a much higher proportion of indirect costs than any of the other hospital-based surgical settings. This may be attributable to the administrative overhead and functions required to operate the facility. In the hospital settings the costs of the administrative functions were allocated across several cost centers. However, in the FSASC setting there was effectively only one cost center--the operating and recovery room--and all administrative costs were applied here. Obviously, the hospital settings had much more flexibility in the collection of indirect costs outside the O.R. and recovery areas even within the Medicare step down allocation methodology. This larger proportion of indirect costs in the FSASC setting distinguished the FSASC setting from most of the hospital-based settings.

The variation among the facility-settings in the components of direct and indirect costs are given in Exhibit III-12. The labor proportion of direct costs was observed to range from 42.7% to 87.2% of total direct cost. The FSASC setting had a substantially smaller direct labor proportion of direct cost (48.3%) than did the hospital based ambulatory surgical center settings. This was apparently due to the higher total cost of medical supplies and medications in the FSASC setting as compared to the HAASCs. As much variation was noted among the ambulatory surgical center settings as among the IP/OP settings in the distribution of direct cost between labor and other items.

Exhibit III-12

Direct and Indirect Cost Components by Facility and Surgical Setting

	IP/OP #1		IP/OP #2		IP/OP #3		IP/OP #4		IP #5		IF #6		HAASC #1		HAASC #2		FSASC	
DIRECT:																		
Labor	1,048,112	42.7%	643,005	56.6%	1,378,343	87.2%	92,200	61.1%	191,521	80.1%	322,671	50.3%	65,702	77.9%	78,316	63.8%	150,876	48.3%
Other	1,406,210	57.3	492,184	43.4	203,095	12.8	58,794	38.9	47,462	19.9	319,065	49.7	18,587	22.1	44,749	36.2	161,660	51.7
TOTAL DIRECT	2,454,322	100.0%	1,135,189	100.0%	1,581,438	100.0%	150,994	100.0%	238,983	100.0%	641,736	100.0%	84,289	100.0%	123,565	100.0%	312,536	100.0%
INDIRECT																		
Depreciation/Rent Building	Not Available		37,589	5.0%	44,731	8.2%	0	0.0%	31,441	15.0%	33,391	10.3%	103,049	45.0%	26,688	31.9%	11,955	2.7%
Depreciation/Rent Movable Equipment			14,953	2.0	20,837	3.8	0	0.0	7,374	3.5	4,650	1.4	5,575	2.4	5,500	6.6	18,217	4.2
Administrative and General			143,367	19.2	174,112	31.8	44,955	55.9	55,450	26.5	115,866	35.9	23,781	10.4	26,644	31.9	378,243	86.2
Nursing Administration			19,699	2.6	47,865	8.8	0	0.0	14,048	6.7	37,308	11.5	5,258	2.3	9,113	10.9	0	0.0
Employee Health and Welfare			76,036	10.2	14,192	2.6	0	0.0	23,825	11.4	39,504	12.2	8,173	3.6	9,649	11.5	12,558	2.9
Maintenance and Plant Operation			53,604	7.2	98,316	18.0	23,147	28.8	19,808	9.5	24,090	7.5	64,922	28.4	0	0.0	15,949	3.6
Central/Supply/ Sterilizing			87,330	11.7	30,536	5.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Medical Records			0	0.0	0	0.0	0	0.0	0	0.0	23,572	7.3	0	0.0	4,057	4.9	600	0.1
Medical Education			146,304	19.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Laundry and Linen			107,849	14.4	32,853	6.0	0	0.0	44,844	21.4	36,673	11.4	6,961	3.0	0	0.0	126	0.3
Cafeteria			6,495	0.9	25,008	4.6	0	0.0	2,774	1.3	7,995	2.5	952	0.4	1,953	2.3	0	0.0
Housekeeping			54,093	7.2	57,443	10.5	12,339	15.3	9,737	4.7	0	0.0	10,214	4.5	0	0.0	0	0.0
Pharmacy			0	0.0	1,081	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
TOTAL INDIRECT	1,051,641	100.0%	747,319	100.0%	546,975	100.0	80,441	100.0%	209,301	100.0%	323,049	100.0%	228,885	100.0%	83,604	100.0%	438,632	100.0%

Source: Medicare Cost Reports
Facility Accounting Records

Substantial variation was also found in the allocation of indirect cost. As may be seen from the exhibit, the inclusion of indirect cost components or indirect costs varies from facility to facility as does the proportionate make up of the total indirect cost amounts. For the FSASC setting, the major cost component of indirect cost is in administrative and general expenses with the largest single item (over two-thirds) of that component reported as a management fee. Very little of the indirect cost could be allocated across other indirect cost components. It should be noted that the depreciation in the building in the FSASC settings was only 2.7% of all indirect cost. Between the two HAASC settings included in the study, major differences in terms of what was allocated as indirect cost, was observed. HAASC #1 reported depreciation as the largest single component of indirect cost with 45.0% of the total as compared with the rental space cost incurred by HAASC #2 which made up 31.9% of its total indirect cost. HAASC #1 also allocated substantial amounts of maintenance and plant operation, and housekeeping, to the facility whereas HAASC #2 reported no allocation in these categories. Similar wide variations were observed in the allocations for the IP/OP facility-settings. The difference observed between facilities and settings in the allocation of indirect costs appeared to result from differences in accounting procedures and conventions. However, no alternative basis for the allocation of indirect costs was available.

Using the direct and indirect costs previously discussed, two indirect cost rates were calculated, the first based on the ratio of indirect cost to direct labor cost and the second the ratio of indirect cost to all direct cost. The rates are presented in Exhibit III-13. Both indirect cost rates were observed to vary substantially among the surgical settings included in the study. For the indirect cost rate based on direct labor, HAASC #1 with a rate of 3.48 and the FSASC (with a rate of 2.90) were considerably higher than the rates in the surgical settings. The high rate in the HAASC #1 was apparently the result of a disproportionately high depreciation allocation to the facility and a low direct labor base because of the relative low procedure volume at the facility during the time period. The high indirect rate at the FSASC setting despite a relative large direct labor

Exhibit III-13

Indirect Cost Rates By Facility and Surgical Setting

FACILITY-SETTING / INDIRECT COST RATE	IP/OP #1	IP/OP #2	IP/OP #3	IP/OP #4	IP #5	IP #6	HAASC #1	HAASC #2	FSASC
Indirect Cost Rate-Direct Labor	1.00	1.16	.40	.87	1.09	1.00	3.48	1.06	2.90
Indirect Cost Rate-All Direct	.43	.65	.35	.53	.88	.50	2.71	.68	1.40

Source: Medicare Cost Reports, Facility Accounting Records base was the result of high administrative and general expenses (particularly the management fee) and an inability to allocate the cost across multiple cost centers as could the hospitals in the study. HAASC #2 appeared to have an indirect cost rate that approximated the cost rates observed for the IP/OP facility settings. When the alternative indirect cost rate calculation based on total direct costs was examined, a similar pattern emerged with the one HAASC and the FSASC settings having high indirect cost rates relative to the other facility-settings included in the study. However, for the procedure specific cost analysis, which makes up the major portion of this chapter, the indirect cost rate calculated using the ratio of indirect cost to direct labor cost was used in the compilation of total procedure costs.

Summary of Findings. The principal finding with regard to indirect costs may be summarized as follows:

- The magnitude and composition of indirect costs varied sharply among facilities. These differences may be attributable to differences in procedure mix and accounting practice as well as real variation in costs. The examination of indirect cost rates is primarily important as an input to the procedure-specific cost analysis which follows.

FINDINGS: SPECIFIC PROCEDURES

In this section, the analysis of the cost of the twelve surgical procedures included in the study is presented. The primary focus of the analysis was on the service costs of the procedures by the type of surgical setting in which the procedure was performed. The service cost included the direct and indirect components of cost as incurred by the facility as well as by the patient as described in detail in the methodology section of this report. Less emphasis was placed on the analysis of opportunity cost because of the major difficulties in computing monetary values for the time lost from normal activity as a result of the surgical episode.

Throughout this section the facility cost is distinguished from the total cost of the surgical episode. The distinction is an important one. Because the principal feature of the evaluation design was the variation in the type of surgical setting, it was important to identify and isolate the costs that were specifically related to the facility in which the surgery was performed. The facility is the principal determinant of the surgical setting type and is the principal organizational unit over which reimbursement policy influence may be exerted. In addition to the analysis of direct and indirect facility and total costs, the principal components of the cost of the surgical episode was also studied. These included:

- Laboratory cost
- Medications cost
- Anesthetic cost
- Supplies cost
- Labor cost (non-physician)
- Physician cost.

As described in the methodology, charges were used as proxy measures for the cost of laboratory tests, radiology examinations, and pathology services as well as physician services (except when the physician was an employee of the institution in which the surgery was performed).

Because the analysis was performed on a procedure-specific basis, comparisons between some settings could not be made for selected procedures. As described in the sampling plan section of the methodology, some procedures were not found, or found only infrequently, to be performed in particular settings. Therefore, for several procedures the only inter-setting comparisons of cost that could be made were between the HAASC and FSASC settings. Although the in-depth analysis was performed for only twelve procedures, relatively consistent patterns of differences between surgical settings were identified. These cross procedure comparisons are discussed in detail below.

To provide additional insight into how and why surgical costs varied among surgical settings, the costs were also analyzed by the phase of the surgical episode in which they were found to occur for selected procedures. The phases of the surgical episode previously defined (screening, pre-operative, operative, post-operative, and recuperative) were used to determine how variations in the process of patient care by setting affected the incidence of cost.

Total and Facility Service Cost by Procedure and Surgical Setting

The total and facility service costs by setting for the procedures included in the study are presented in Exhibit III-14 and III-15 respectively. These two tables summarize the major findings of the study with respect to the costs of surgical services in alternative settings.

It may be seen from the distribution of total cost that for four procedures (adenoidectomy and myringotomy, ganglionectomy, inguinal herniorrhaphy, and advancement and recession of eye muscle) the IP setting appears to be the lowest cost setting for surgery, contrary to expectations. However, it should be noted that this apparently anomalous finding resulted in part from the inclusion of an IP setting that typically did not involve a physician charge to the patient for the surgery because of the nature of the institution--a crippled childrens' hospital. Therefore, for three of the four procedures in this group that were predominantly performed on children in the IP setting, adenoidectomy and myringotomy, inguinal herniorrhaphy, and advancement and recession of eye muscle, the average total costs are understated because of the absence of a physician's charge for some patients. This situation was corrected by analysis of the facility based costs of surgery which excludes physician charges as discussed later in this section. For the ganglionectomy procedure where the IP setting cost was also less than the costs in the alternative settings, no such explanation may be made. However, the number of observations in the IP setting (three) was very small and provided less confidence in the average total cost compilation. With the exception of the three procedures where the physician's charge could not be estimated, the FSASC setting apparently resulted in a lower average cost than the IP setting for four of the five comparable

Exhibit III-14

Total Cost by Procedure and Surgical Setting

Procedure \ Surgical Setting	Inpatient			Outpatient			HMASC			FSASC		
	X̄	σ	N	X̄	σ	N	X̄	σ	N	X̄	σ	N
1. Myringotomy and Adenoidectomy	$439.58[1]	$ 97.98	17	$553.90	$ 31.64	6	$618.38	$101.91	27	$540.25	$79.91	29
2. Tonsillectomy and Adenoidectomy	583.70	97.25	13	-		-	622.04	61.66	29	475.24	21.65	14
3. Dilation and Curettage	567.34	122.61	17	405.75	118.34	17	405.73	68.68	60	383.19	55.97	60
4. Laparoscopy with B.T.C.	765.59	61.32	3			-	580.39	55.83	34	564.34	51.67	61
5. Breast Mass Excision	852.21	173.60	13	-	-	-	522.28	120.64	30	522.67	221.60	34
6. Ganglionectomy	415.70	77.02	3				528.15	115.76	26	473.77	123.31	35
7. Inguinal Herniorrhaphy	482.13[1]	59.87	6	-	-					727.55	89.79	37
8. Vasectomy	-	-	-	-	-	-	449.14	36.95	7	350.00	38.69	40
9. Circumcision	-	-	-	-	-	-	492.01	.98	3	383.22	35.61	11
10. Augmentation Mammoplasty	*	*	*	1393.10	93.80	7	1274.41	171.35	27	1222.86	194.40	18
11. Advancement or Recession of Eye Muscle	642.93[1]	50.81	17	-		-	967.21	109.29	23	897.75	208.94	27
12. Excision of Lipoma or Sebaceous Cyst	*	*				-	378.29	104.14	14	330.63	82.97	26

Source: Facility Accounting Records, Resource Utilization Study, Medical Record Abstracts, Patient Interviews

[1] Values reported for this procedure do not reflect true total cost since physician services were not charged to the patient at a principal institution, thus lowering the observed total cost.

Note: In this exhibit as well as a number of others in this chapter, an asterisk (*) is used to designate fewer than 3 cases and a slash (-) to indicate no cases.

Exhibit III-15

Facility Cost by Procedure and Surgical Setting

Procedure \ Surgical Setting	IP			OP			HAASC			FSASC		
	$\bar{X}$	σ	N	$\bar{X}$	σ	N	$\bar{X}$	σ	N	$\bar{X}$	σ	N
1. Myringotomy and Adenoidectomy	$273.49	$ 33.56	17	$134.67	$ 29.28	6	$190.82	$ 48.05	28	$130.28	$11.49	30
2. Tonsillectomy and Adenoidectomy	285.40	73.19	19		*		232.77	15.65	23	155.80	14.17	15
3. Dilation and Curettage	297.96	97.42	18	135.45	97.81	18	150.27	40.67	63	119.77	12.04	61
4. Laparoscopy with B.T.C.	280.79	61.32	3	154.67	39.08	37	131.58	43.42	36	131.90	12.81	61
5. Breast Mass Excision	408.39	139.18	14			*	223.11	59.26	33	157.71	27.03	35
6. Ganglionectomy	313.86	63.37	3	*	*	*	190.62	47.37	29	144.97	14.35	37
7. Inguinal Herniorrhaphy	271.76	52.47	6	*	*	*	*	*	*	156.15	13.51	38
8. Vasectomy	-	-	-	-	-	-	194.67	34.16	7	133.18	7.40	41
9. Circumcision	*	*	*	-	-	-	129.18	.97	3	138.94	8.14	12
10. Augmentation Mammoplasty	*	*	*	169.27	39.52	7	261.06	64.94	27	200.61	22.75	25
11. Advancement or Recession of Eye Muscle	262.38	48.55	17	*	*	*	198.80	10.72	24	147.07	16.77	27
12. Excision of Lipoma or Sebaceous Cyst	*	*	*	*	*	*	169.36	45.93	14	140.13	17.98	27

Source: Facility Accounting Records, Resource Utilization Study, Medical Record Abstracts, Patient Interviews procedures. The differences in cost between the IP and FSASC setting were statistically significant with $p < .05$. The greatest percent savings were observed for breast mass excision (38.7%) and dilation and curettage (32.5%).

Comparison of the cost of surgery in the alternative ambulatory surgical settings revealed that the FSASC setting was generally less costly than either the OP or HAASC settings for the comparable procedures that were observed. For the three comparable procedures between the OP and FSASC settings, all three (myringotomy and adenoidectomy, dilation and curettage, and augmentation mammoplasty) experienced less average total cost in the FSASC setting than in the OP setting. For dilation and curettage and augmentation mammoplasty the differences in cost between settings were statistically significant with $p \leq .05$. The cost differences between the HAASC and FSASC were also favorable to the FSASC setting with ten of the eleven comparable procedures included in the study showing less total cost in the FSASC setting than in the HAASC setting. Only for breast mass excision was the total cost less in the HAASC setting; however the difference in mean cost was less than one dollar and was not statistically significant for this procedure. For the ten procedures with higher costs in the HAASC setting, the percent difference between settings ranged from 2.8% for a laparoscopy with B.T.C. to 23.6% for a tonsillectomy and adenoidectomy. The latter procedure was more costly in the HAASC setting because of the frequent practice of admitting HAASC patients undergoing this procedure for an overnight stay in the inpatient hospital for observation. Two other procedures, vasectomy and circumcision, both urological surgeries, were considerably more costly in the HAASC setting than in the FSASC setting both with differences of 21.1% in total cost. Of the ten procedures, five were significantly higher in cost in the HAASC setting than in the FSASC setting with $p < .05$. These procedures were myringotomy and adenoidectomy, tonsillectomy and adenoidectomy, dilation and curettage, vasectomy, and circumcision.

Of the twelve procedures included in the study, augmentation mammoplasty was apparently the most costly procedure with an average cost of $1,222.86 in the FSASC setting, $1,274.41 in the HAASC setting, and $1,393.10 in the OP setting. Advancement or recession of eye muscle was also relatively costly with averages of $897.75 in the FSASC and $967.21 in the HAASC settings. Excision of lipoma or sebaceous cyst was the least costly procedure with an average cost of $330.63 in the FSASC setting and $378.29 in the HAASC setting. (By contrast to these cost data, physicians' charge information in the institutional settings is presented in Exhibit III-21. Also, physicians' charges for six procedures performed in their offices are presented on page III-63.)

Analysis of total facility cost, which excluded physician charges and miscellaneous costs incurred by the patient in the screening and recuperation phases before and after the stay in the facility in which the surgery was performed, showed substantial and pervasive differences in the cost of surgery between alternative settings.

For the eight comparable procedures which were observed in the IP as well as one or more ambulatory settings, the IP setting was substantially more costly than any of the ambulatory settings. The FSASC setting was less costly than the IP setting for all eight comparable procedures; for five of eight procedures, the cost in the FSASC setting was less than one-half the cost in the IP setting. The percent differences in cost ranged from 42.5% for inguinal herniorrhaphy to 61.4% for excision of breast mass. The differences in facility cost between the IP and FSASC settings for the eight procedures were all statistically significant with $p \leq .05$.

Again for total facility cost, the FSASC setting was also observed to be less costly than the OP setting for three of four comparable procedures. However, only the 11.6% for dilation and curettage and the 14.7% difference for laparoscopy with B.T.C. were statistically significant. Only one procedure, augmentation mammoplasty, was found to be more costly (by 18.5%) in the FSASC setting than in the OP setting.

The FSASC setting also incurred less facility cost than the HAASC setting for nine of the eleven comparable procedures included in the study. All nine differences were statistically significant with $p \leq .05$. However, for laparoscopy with B.T.C. and circumcision, the HAASC setting appeared to be somewhat less costly. The difference for laparoscopy with B.T.C. was not statistically significant whereas the difference for circumcision was only marginally significant. It should be noted that the number of observations for circumcision in the HAASC setting was very small, however, and the confidence in the estimate should not be considered high. The relative differences in procedure facility cost between the HAASC and FSASC setting was observed to be quite high, ranging from 17.3% for excision of lipoma or sebaceous cyst to 44.9% for tonsillectomy and adenoidectomy. Dilation and curettage, the most frequently performed procedure in ambulatory settings, incurred an average facility cost of $150.27 in the HAASC setting and $119.77 in the FSASC setting--the FSASC thus experienced 20.3% less cost than the HAASC setting for this procedure. Dilation and curettage was the least costly procedure observed in the FSASC setting.

Summary of Findings. With respect to the total costs and the total facility incurred cost for the surgical episode, it was found that:

- With the exception of three procedures where the physician's charge could not be estimated, the FSASC setting was found to experience less average total cost than the IP setting for four out of five comparable procedures. The savings for these four procedures ranged from 18.6% for tonsillectomy and adenoidectomy to 38.7% for breast mass excision. The differences in total costs between the IP and FSASC settings were statistically significant for the four procedures with $p \leq .05$.

- Surgery performed in the FSASC setting was found to incur less average total cost than surgery performed in the HAASC setting for ten of eleven comparable procedures. The savings ranged from 2.8% for a laparoscopy with B.T.C. to 23.6% for a tonsillectomy and adenoidectomy. Five of the ten differences in cost were significantly different at $p < .05$. The total costs for breast mass excision were somewhat higher in the FSASC setting than in the HAASC setting but the difference was not statistically significant.

- For the three comparable procedures performed in the OP setting, the FSASC setting was observed to have less average total cost for all three, with differences of 2.5% for myringotomy with adenoidectomy, 5.6% for dilation and curettage and 12.2% for augmentation mammoplasty.

- In terms of facility incurred costs only (excluding physician charges and patient costs before and after the stay at the surgical facility), the FSASC setting was less costly than the IP setting for all eight comparable procedures included in the study. The percent differences ranged from 42.5% for inguinal herniorrhaphy to 61.4% for breast mass excision. The differences were statistically significant with $p \leq .05$.

- Again for facility incurred costs, the FSASC setting was also observed to be less costly than the OP setting for three of four comparable procedures; however, only the 11.6% difference for dilation and curettage and 14.7% difference for laparoscopy with B.T.C. were statistically significant. The facility cost of an augmentation mammoplasty was found to be 18.5% more costly in the FSASC setting than in the OP setting.

- When the facility cost was compared for the HAASC and FSASC settings, the cost in the FSASC setting was found to be lower for nine of eleven comparable procedures. The percent difference ranged from 17.3% for excision of lipoma or sebaceous cyst to 44.9% for tonsillectomy and adenoidectomy. Differences for these nine procedures were statistically significant with $p \leq .05$. Only two of the procedures included in the study were found to have higher facility costs in the FSASC setting than in the HAASC setting (laparoscopy with B.T.C. and circumcision). However, the differences were not statistically significant.

Components of Cost

Six selected components of direct cost of surgical procedures were analyzed and the principal inter-setting differences for each component are discussed in the following paragraphs.

Laboratory, Radiology, and Pathology Costs. Included in laboratory costs were the costs (or charges where a proxy measure was used) of clinical laboratory tests, radiology, and pathology examinations. Exhibit III-16 presents the laboratory cost by procedure and surgical setting. As expected, the overall laboratory cost in the IP setting was substantially higher than for any of the ambulatory settings for all eight comparable procedures. The laboratory cost in the FSASC setting was the lowest of the settings for all twelve procedures, reflecting the occurrence of minimal clinical tests and pathology costs for this setting. The OP setting and the HAASC setting were between the IP and the FSASC settings in the range of costs. Of all procedures included in the study breast mass excision experienced the highest laboratory costs as a result of the frequent use of a frozen section for the pathology examination. The average cost for this component of cost ranged from $154.20 in the IP setting to $20.29 in the FSASC setting.

The overall pattern of differences in laboratory costs was reasonably consistent. The procedures performed in the HAASC setting were all less costly in terms of laboratory costs than the comparable procedures performed in the IP setting. In turn, the procedures performed in the FSASC setting were all less costly than comparable procedures performed in the HAASC setting.

Medications Costs. Medications costs were observed to vary considerably from procedure to procedure and between surgical settings as shown in Exhibit III-17. In five of the eight comparable procedures in the IP setting, the medications cost was higher for the IP setting than for the alternative settings. For two of the four procedures performed in the OP setting (dilation and curettage, augmentation mammoplasty), the medications cost was higher in the OP setting than in the other surgical settings. For the other two procedures (myringotomy and adenoidectomy, laparoscopy with B.T.C.) the medications cost was the lowest in the OP setting.

Between the HAASC and FSASC settings, medications cost was observed to be lower in the HAASC setting for eight of the eleven comparable procedures. It is interesting to note that the costs of medications among the three ambulatory settings were

Exhibit III-16

Laboratory Cost, by Surgical Procedure and Setting

Procedure / Surgical Setting	IF			OP			HAASC			FSASC		
	X̄	σ	N	X̄	σ	N	X̄	σ	N	X̄	σ	N
1. Myringotomy and Adenoidectomy	$ 59.64	$17.02	17	$34.73	$ 5.46	6	$46.61	$ 5.10	28	$ [illegible].32	$ 2.74	30
2. Tonsillectomy and Adenoidectomy	[illegible]	[illegible]	12				[illegible]	[illegible]	23	[illegible]	[illegible]	[illegible]
3. Dilation and Curettage	[illegible]	29.30	18	35.[illegible]	[illegible]	18	44.27	4.99	63	[illegible]	0.0	[illegible]
4. Laparoscopy with B.T.C.	[illegible]	25.72	3	24.17	10.[illegible]	37	23.18	[illegible].87	36	0.[illegible]	0.96	61
5. Breast Mass Excision	154.70	42.96	14				33.32	27.22	33	20.29	24.12	35
6. Ganglionectomy	113.38	63.37	3				43.58	15.32	29	6.69	2.36	37
7. Inguinal Herniorrhaphy	49.33	18.10	6						*	6.91	2.05	38
8. Vasectomy	-	-	-	-	-	-	44.21	0.55	7	7.3[illegible]	1.17	41
9. Circumcision		*		-	-	-	45.45	0.0	3	2.50	3.69	12
10. Augmentation Mammoplasty		*		13.58	35.93	7	19.83	13.56	27	1.10	4.21	25
11. Advancement or Recession of Eye Muscle	39.26	11.46	17		*		10.16	3.98	24	0.0	0.0	27
12. Excision of Lipoma or Sebaceous Cyst		*					41.31	15.22	14	8.60	4.03	27

Source: Facility Accounting Records, Resource Utilization Study, Medical Record Abstracts, Patient Interviews

* Indicates fewer than 3 cases
- Indicates no cases

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Exhibit III-17

Medications Cost, by Surgical Procedure and Setting

SURGICAL SETTING / PROCEDURE	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
1. Myringotomy and Adenoidectomy	$11.[illegible]	$ 3.61	1[illegible]	$ 5.79	$ 0.64	6	$ 1[illegible].86	$ [illegible]	28	$ 1[illegible].78	[illegible]26.[illegible]	[illegible]
2. Tonsillectomy and Adenoidectomy	12.05	11.35	19				11.18	7.50	23	3.71	1.60	15
3. Dilation and Curettage	10.41	9.02	18	14.18	12.81	18	2.31	3.29	63	3.89	4.74	[illegible]
4. Laparoscopy With B.T.C.	4.29	1.65	3	2.59	1.08	37	3.01	3.10	36	3.27	3.45	6[illegible]
5. Breast Mass Excision	4.12	1.61	14		·	·	3.36	4.31	33	4.17	4.53	35
6. Ganglionectomy	33.02	5.26	3			·	3.49	3.27	29	4.54	3.93	37
7. Inguinal Herniorrhaphy	1.35	0.60	6	·		·			·	0.99	1.73	38
8. Vasectomy	-	-	-	-	-	-	1.35	0.63	7	2.99	2.34	41
9. Circumsion	·	·		-	-	-	3.38	0.53	3	1.24	1.22	12
10. Augmentation Mammoplasty	·			21.94	22.73	7	14.45	28.59	27	17.72	12.74	25
11. Advancement or Recession of Eye Muscle	4.14	2.46	17			·	3.91	2.55	24	3.61	4.27	27
12. Excision of Lipoma or Sebaceous Cyst	·	·	·	·	·	·	2.25	2.70	14	5.33	12.83	27

·Indicates fewer than 3 cases
-Indicates no cases

Source: Resource Utilization Study, Facility Accounting Records,
Medicare Cost Reports

approximately the same for all but two procedures. For tonsillectomy and adenoidectomy the medications cost in the HAASC setting ($11.18) was three times the FSASC setting ($3.71) reflecting the fact that patients in the HAASC setting were transferred to the inpatient facility for one day of recuperation during which medication was administered. (It is likely that more medications and more expensive medications were used in inpatient recuperation as compared with home recuperation.) In the case of dilation and curettage the OP setting generally experienced higher average medication costs ($14.18) than did the other ambulatory settings ($2.31 for HAASC and $3.89 for FSASC).

Anesthesia Supplies Cost. Anesthesia supplies cost was found to be a very small proportion of the total procedure cost. The average cost of anesthesia agents was less than $1.00 for all procedures included in the study with no systematic pattern occuring across surgical settings, as shown in Exhibit III-18.

Supplies Cost. Of the facility incurred direct costs, supplies costs was second only to labor cost as the most costly component of a surgical procedure. Exhibit III-19 shows the average supply cost by setting for each of the procedures included in the study. It may be seen from the supplies cost analysis that for all procedures, with the exception of advancement or recession of eye muscle, the IP setting incurred the highest supplies cost of the alternative surgical settings. Furthermore, the OP setting for the four comparable procedures was more costly in terms of supplies than were either the HAASC or the FSASC settings. All of these differences were statistically significant with $p \leq .05$.

The pattern of differences in supplies cost for the FSASC settings were mixed. For five of the eleven procedures, the HAASC experienced lower costs while the FSASC was lower for the other six procedures. In all settings, the augmentation mammoplasty procedures was the most costly in terms of supply costs with $49.11 in the OP, $34.72 in HAASC, and $40.63 in the FSASC setting. In the HAASC and FSASC settings tonsillectomy and adenoidectomy and excision of lipoma or sebaceous cyst were the least costly procedures for supplies.

Exhibit III-18

Anesthesia Supplies Cost, by Surgical Procedure and Setting**

SURGICAL SETTING / PROCEDURE	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
1. Myringotomy and Adenoidectomy	$ 0.13	$ 0.22	17	$ 0.08	$ 0.08	6	$ 0.09	$ 0.12	28	$ 0.01	$ 0.04	32
2. Tonsillectomy and Adenoidectomy	0.13	0.19	19				0.24	0.25	23	0.16	0.22	18
3. Dilation and Curettage	0.48	0.22	18	0.38	0.13	18	0.61	0.07	63	0.68	0.18	61
4. Laparoscopy With B.T.C.	0.35	0.05	3	0.56	0.23	37	0.78	0.18	36	0.69	0.15	61
5. Breast Mass Excision	0.44	0.15	14		*	*	0.44	0.20	33	0.57	0.27	35
6. Ganglionectomy	0.37	0.07	3			*	0.40	0.25	29	0.55	0.33	37
7. Inguinal Herniorrhaphy	0.88	0.11	6	*		*			*	0.05	0.13	38
8. Vasectomy	-	-	-	-	-	-	0.50	0.05	7	0.22	0.35	41
9. Circumcision	*	*	*	-	-	-	0.69	0.12	3	0.48	0.33	12
10. Augmentation Mammoplasty	*	*		0.0	0.0	7	0.29	0.30	27	0.18	0.27	25
11. Advancement or Recession of Eye Muscle	0.14	0.19	17	*	*	*	0.19	0.20	24	0.26	0.23	27
12. Excision of Lipoma or Sebaceous Cyst	*	*	*	*		*	0.13	0.24	14	0.26	0.38	27

*Indicates fewer than 3 cases
-Indicates no cases

Source: Resource Utilization Study, Facility Accounting Records, Medicare Cost Reports

**The anesthesia costs in this exhibit include only general anesthetic; the local anesthetics used, for example, in the augmentation mammoplasty or any other procedure are included elsewhere as medication costs.

Exhibit III-19

Supplies Cost, by Surgical Procedure and Setting

PROCEDURE / SURGICAL SETTING	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
1. Myringotomy and Adenoidectomy	$ 28.84	$ 4.32	17	$ 20.72	$ 4.86	6	$ 17.20	$ 2.18	28	$ 17.79	$ 9.58	30
2. Tonsillectomy and Adenoidectomy	23.80	7.30	19		*	-	13.33	1.54	23	8.69	0.97	15
3. Dilation and Curettage	24.82	12.09	18	19.80	20.75	18	17.87	24.79	63	14.80	1.71	61
4. Laparoscopy With B.T.C.	23.05	3.10	3	19.31	5.62	37	18.88	2 67	36	15.73	0.48	61
5. Breast Mass Excision	23.31	8.85	14	-			20.37	5.90	33	20.07	0.32	35
6. Ganglionectomy	21.21	1.06	3	-	-	-	22.36	5.72	29	16.76	1.34	37
7. Inguinal Herniorrhaphy	31.60	5.77	6	-	-	-	-		*	25.84	0.30	38
8. Vasectomy	-	-	-	-	-	-	16.42	5.30	7	17.35	1.17	41
9. Circumcision	*	*	*	-	-	-	26.35	0.21	3	14.96	0.21	12
10. Augmentation Mammoplasty	*	*	*	49.11	2.70	7	34.72	6.16	27	40.63	40.12	25
11. Advancement or Recession of Eye Muscle	28.77	5.89	17	*	*	*	20.40	10.19	24	34.64	56.50	27
12. Excision of Lipoma or Sebaceous Cyst	*	*	*	*	*	*	13.93	2.98	14	14.61	0.34	27

*Indicates fewer than 3 cases
-Indicates no cases

Source: Resource Utilization Study, Facility Accounting Records, Medicare Cost Reports

Labor Cost. The Staff Labor component of direct cost showed the most significant differences among surgical setting by procedure as compared to the other cost components. This is shown in Exhibit III-20. In all eight comparable procedures the IP setting was significantly higher (p. $\leq$ .05) than the costs of labor in the alternative settings (with the exception of the IP-OP difference for laparoscopy with B.T.C.). Furthermore, the OP setting incurred significantly higher staff labor cost for the four comparable procedures than did the other ambulatory settings. The individual procedure differences in staff labor cost between the HAASC and FSASC settings were, with two exceptions, consistently in favor of the FSASC but were less pronounced. Only for circumcision and excision of lipoma or sebaceous cyst were the HAASC staff labor costs less than the FSASC costs. Eight of the nine procedures for which the FSASC cost was lower were statistically significant with p $\leq$ .05. Only for one of the two procedures where the HAASC cost was lower was the difference statistically significant, however.

Physician Charges. The physician's charge cost component (including both surgeons and anesthesiologists), shown in Exhibit III-21, was observed not to exhibit much variation between settings for the same surgical procedure except for myringotomy and adenoidectomy, inguinal herniorrhaphy, and advancement and recession of eye muscle performed in the IP setting where the average charge observed was low relative to the other surgical settings. This was apparently due to the inclusion of one facility specializing in the care of children where, in many cases, the physician charges were not billed to the patient for certain surgical procedures and thus not observed in the analysis. With the exception of these procedures in this setting, the average physician charges were similar. However, it must be noted that, as discussed in the methodology, the method used to impute physicians charges by procedure and setting may have resulted in the average charges being more homogeneous within settings than they might have been if all data on physician charges could have been obtained. Bearing in mind this limitation, it may be seen that between the HAASC and the FSASC

Exhibit III-20

Staff Labor Cost, by Surgical Procedure

SURGICAL SETTING / PROCEDURE	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
1. Myringotomy and Adenoidectomy	$ 90.85	$ 29.41	17	$ 39.10	$ 17.70	6	$ 32.13	$ 5.34	28	$ 28.79	$ 2.63	30
2. Tonsillectomy and Adenoidectomy	86.12	44.43	19	*	*	*	54.19	4.09	23	37.09	3.94	15
3. Dilation and Curettage	89.77	59.74	18	44.97	19.55	18	28.18	6.41	63	24.54	2.97	61
4. Laparoscopy With B.T.C.	73.94	26.28	3	67.37	22.57	37	29.25	3.70	36	29.11	3.15	61
5. Breast Mass Excision	88.72	36.77	14	*	*	*	31.23	5.24	33	29.42	2.35	35
6. Ganglionectomy	67.30	1.19	3	*	*	*	32.25	3.41	29	30.67	3.10	37
7. Inguinal Herniorrhaphy	105.79	34.16	6	*	*	*	*	*	*	31.49	3.47	38
8. Vasectomy	-	-	-	-	-	-	31.32	4.50	7	27.74	1.74	41
9. Circumcision	*	*	*	-	-	-	27.31	0.60	3	30.70	1.81	12
10. Augmentation Mammoplasty	*	*	*	51.39	5.20	7	46.43	5.82	27	43.13	5.81	25
11. Advancement or Recession of Eye Muscle	102.65	32.47	17	*	*	*	37.29	2.13	24	32.99	4.20	27
12. Excision of Lipoma or Sebaceous Cyst	*	*	*	*	*	*	29.44	2.83	14	29.60	4.13	27

*Indicates fewer than 3 cases
-Indicates no cases

Source: Resource Utilization Study, Facility Accounting Records,
Medicare Cost Reports

Exhibit III-21

Physician Charges, by Surgical Procedure and Setting

SURGICAL SETTING / PROCEDURE	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
1. Myringotomy and Adenoidectomy	$123.55	$102.37	17	$ 335.67	$ 4.95	6	$337.66	$ 57.40	28	$375.19	$ 65.22	30
2. Tonsillectomy and Adenoidectomy	251.17	75.32	19	-	-	-	287.95	73.52	20	301.35	12.69	15
3. Dilation and Curettage	250.08	81.56	18	240.08	46.40	17	239.13	30.54	61	247.88	45.70	61
4. Laparoscopy With B.T.C.	459.00	0.0	3	-	-	-	437.47	58.40	35	418.68	48.70	61
5. Breast Mass Excision	393.66	55.78	13	*	*		296.51	81.14	30	318.15	122.81	34
6. Ganglionectomy	*	*	*	*	*		316.75	78.14	26	278.34	76.56	36
7. Inguinal Herniorrhaphy	198.33	69.40	6	*					*	536.62	97.45	37
8. Vasectomy	-	-	-	-	-	-	248.66	11.29	7	206.26	35.32	41
9. Circumcision	-	-	-	-	-	-	352.00	0.0	3	238.49	45.88	12
10. Augmentation Mammoplasty	*	*	*	1165.00	77.78	7	974.02	163.59	27	947.84	173.99	20
11. Advancement or Recession of Eye Muscle	360.00	0.0	17	*	*	*	745.01	97.34	24	696.52	135.21	27
12. Excision of Lipoma or Sebaceous Cyst	*	*	*	*	*	*	195.91	72.51	14	167.57	65.45	27

*Indicates fewer than 3 cases
-Indicates no cases

Source: Resource Utilization Study, Facility Accounting Records, Medicare Cost Reports

settings less than a $50 difference was observed in the physician charge for all but one procedure (circumcision) with the FSASC setting showing a somewhat lower physician charge for eight of the eleven comparable procedures.

Although no observations of surgical procedures were made in physicians offices, discussions were held with a small number of physicians who reported that they performed six of the twelve procedures included in the study. The range of charges reported by these physicians for selected procedures were as follows: myringotomy with adenoidectomy $90-$150; dilation and curettage $90-$195; vasectomy $150-$175; circumcision $100; augmentation mammoplasty $760-$1,260; and excision of lipoma or sebaceous cyst $35-$100. The physicians stated that these charges for surgery performed in the office setting were generally inclusive of all services related to the surgical episode.

Indirect Cost by Procedure and Surgical Setting. Exhibit III-22 presents the indirect costs, computed as a proportion of direct labor, by surgical setting for the procedures included in the study (the values used in these computations have been presented previously in Exhibits III-13 and III-20). The pattern of indirect cost was less consistent than the pattern of occurrence of total cost and direct costs in the previous section.

For the eight comparable procedures in the IP setting the indirect cost was the highest for the IP setting for four of the eight procedures. However, for two procedures, inguinal herniorrhaphy and advancement or recession of eye muscle, the indirect cost observed for the IP setting was less than the alternative ambulatory settings.

With the four comparable procedures in the OP setting, a consistent pattern was observed. For these procedures, the OP setting experienced the least indirect cost of the alternativve surgical settings, reflecting a combination of lower indirect cost rates for the OP settings than the HAASC and FSASC settings and generally lower direct personnel cost per procedure than the IP setting as discussed later in this section.

Exhibit III-22

Indirect Cost by Procedure and Surgical Setting

SURGICAL SETTING / PROCEDURE	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
1. Myringotomy and Adenoidectomy	$ 90.29	$16.06	17	$ 36.04	$11.74	6	$ 92.61	$ 42.54	28	$ 83.49	$ 7.64	30
2. Tonsillectomy and Adenoidectomy	110.98	19.93	19	*	*		159.59	6.07	23	107.56	11.42	15
3. Dilation and Curettage	109.38	40.67	18	37.50	36.50	18	62.58	39.32	63	71.18	8.61	61
4. Laparoscopy With B.T.C.	108.25	46.89	3	40.66	28.22	37	57.55	41.31	36	84.43	9.14	61
5. Breast Mass Excision	138.01	65.60	14	*	*	*	84.67	41.59	33	85.33	6.82	35
6. Ganglionectomy	103.08	2.63	3	*	*	*	90.28	41.30	29	88.94	8.98	37
7. Inguinal Herniorrhaphy	83.10	18.54	6	*	*	*	*		*	91.32	10.06	38
8. Vasectomy	-	-	-	-	-	-	100.87	34.98	7	80.46	5.05	41
9. Circumcision	*	*	*	-	-	-	28.95	0.63	3	89.05	5.26	12
10. Augmentation Mammoplasty	*	*	*	51.39	5.20	7	150.78	43.00	27	125.09	16.85	25
11. Advancement or Recession of Eye Muscle	87.41	18.60	17	*	*	*	129.75	7.42	24	95.68	12.19	27
12. Excision of Lipoma or Sebaceous Cyst	*	*	*	*	*	*	83.52	36.52	14	85.85	11.98	27

*Indicates fewer than 3 cases
-Indicates no cases

Source: Resource Utilization Study, Facility Accounting Records.
Medicare Cost Reports

The incidence of indirect cost was mixed when HAASC and FSASC settings were compared. For seven of the eleven comparable procedures the FSASC experienced less average indirect cost with five of the seven differences significant with $p < .05$. In four procedures, the HAASC indirect cost was less than the FSASC setting with three of the four differences found to be statistically significant.

Summary of Findings. With respect to the components of surgical cost it was found:

- The physician charge for professional services was found to be the largest single component of the cost of surgery accounting for one-third to two-thirds of the total surgical episode cost. With only minor exceptions, the physician charge was not found to vary significantly across surgical settings.
- Indirect costs were the second largest cost of the surgical episodes and generally showed as much variation among procedures as among settings. The OP setting however, seemed to experience somewhat lower indirect costs than the other ambulatory settings.
- Staff labor costs were observed to be lower for most procedures in the FSASC setting than in the alternative surgical settings. Staff labor costs were substantially higher in the IP setting than in the ambulatory settings as a result of the general nursing ward costs incurred.
- Supplies costs and laboratory, radiology, and pathology costs were all observed to be lower in the FSASC setting than in the alternative hosptial-based settings for most procedures.
- Little variation across settings was observed for either medication or anesthetic supplies cost.

Surgical Cost by Phase

As expected, the surgical settings were found to experience different distributions of costs by phase of the surgical episode. The major differences were found, between the inpatient and ambulatory settings where the overnight stay in the facility prior to and after the day of surgery in the inpatient setting resulted in the accumulation of cost in the preoperative and recuperative phases of the surgical episode.

Exhibits III-23, III-24, III-25, and III-26 show the cost distribution by phase for four surgical procedures: myringotomy with adenoidectomy, dilation and curettage, laparoscopy with B.T.C., and advancement or recession of eye muscle. It should be kept in mind in reviewing these data that these refer only to costs that could be attributed to a specific phase. Thus, incurred costs that could not be attributed are not included.

For the myringotomy with adenoidectomy procedure performed in the IP setting it may be seen that 63% of the total cost that could be attributed to a specific phase was incurred in the preoperative and recuperative phases. The least amount of cost was incurred in the screening phase and only 8.9% of the total cost was incurred in the post operative or recovery room phase. This distribution contrasts sharply with the distribution of costs in the OP, HAASC and FSASC settings where the largest proportion of total cost was incurred in the operative phase (44.5% for OP, 57.4% for HAASC and 61.3% for FSASC). Only a small proportion of the total cost was incurred in the screening phase. It was noted that the FSASC setting incurred only 5.5% of the total cost in the preoperative phase as compared with 21.3% and 14.4% in the OP and HAASC respectively. This reflected the higher cost of laboratory services performed in the hospital-based settings as compared to the FSASC setting. In the operative phase, although the FSASC setting incurred the highest proportion of costs, the absolute dollar amount of cost was highest in the HAASC setting for this procedure.

As may be seen for dilation and curettage, laparoscopy with B.T.C., and advancement or recession of eye muscle, approximately the same distributions of cost by phase were found to occur as for the myringotomy with adenoidectomy procedure.

<ins>Summary of Findings.</ins> Three principal findings emerged from the analysis of surgical cost by phase for four selected procedures.

Exhibit III-23

Total Cost* and Distribution Across Phases for Myringotomy and Adenoidectomy, by Surgical Setting

SURGICAL SETTING / PHASE	IP		OP		HAASC		FSASC	
	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase
Screening	$ 11.76	3.8%	$ 7.50	4.7%	$ 6.11	2.9%	$ 4.89	3.3%
Pre-operative	119.97	38.9	33.33	21.3	30.23	14.4	8.10	5.5
Operative	74.76	24.2	69.64	44.5	120.75	57.4	90.47	61.3
Post-Operative	27.44	8.9	29.10	18.6	40.12	19.1	34.70	23.5
Recuperative	74.33	24.1	16.86	10.7	13.11	6.2	9.53	6.4
Total	308.26	99.9%	156.43	99.8%	210.32	100.0%	147.69	100.0%

*This exhibit includes only those costs that could be attributed to a specific surgical phase.

Source: Resource Utilization Study, Facility Accounting Records, Medicare Cost Reports

Exhibit III-24

Total Cost* and Distribution Across Phases for Dilation and Curettage, by Surgical Setting

SURGICAL SETTING / PHASE	IP		OP		HAASC		FSASC	
	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase
Screening	$ 2.87	0.9%	$ 6.90	4.6%	$ 7.04	4.3%	$ 6.90	5.2%
Pre-operative	116.08	37.4	34.83	23.3	26.09	16.0	6.72	5.1
Operative	87.08	28.1	72.41	48.3	93.19	57.2	81.91	67.7
Post-Operative	21.35	6.9	21.12	14.1	30.70	18.8	32.84	24.7
Recuperative	82.84	26.7	14.51	9.7	5.94	3.6	4.42	3.3
Total	310.22	100.0%	149.77	100.0%	162.96	99.9%	132.79	100.0%

*This exhibit includes only those costs that could be attributed to a specific surgical phase.

Source: Resource Utilization Study Facility Accounting Records,
Medicare Cost Reports

Exhibit III-25

Total Cost and Distribution Across Phases For Laparoscopy With BTC, by Surgical Setting

SURGICAL SETTING / PHASE	IP		OP		HAASC		FSASC	
	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase
Screening	$ 9.84	3.2%	$ 5.04	3.0%	$ 4.61	3.2%	$ 5.60	3.9%
Pre-operative	125.36	40.9	32.48	19.4	29.91	21.1	8.64	6.0
Operative	78.90	25.7	106.41	63.5	76.85	54.1	87.78	60.9
Post-Operative	22.71	7.4	21.29	12.7	26.59	18.7	37.22	25.8
Recuperative	69.79	22.8	2.37	1.4	4.03	2.8	4.96	3.4
Total	306.60	100.0%	167.59	100.0%	141.99	99.9%	144.20	100.0%

Source: Resource Utilization Study, Facility Accounting Records, Medicare Cost Reports

Exhibit III-26

Total Cost and Distribution Across Phases for Advancement Or Recession of Eye Muscle, by Surgical Setting

PHASE \ SURGICAL SETTING	IP		OP		HAASC		FSASC	
	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase	$\bar{x}$ cost	% in each phase
Screening	$ 5.45	1.9%	*	%	$ 7.34	3.3%	$ 8.64	4.8%
Pre-operative	114.88	40.6	*		25.15	11.3	7.23	4.0
Operative	67.39	23.8	*		130.47	58.4	101.40	56.0
Post-Operative	26.50	9.4	*		48.22	21.6	39.92	22.0
Recuperative	68.71	24.3	*		12.00	5.4	23.92	13.2
Total	282.93	100.0%	*		223.18	100.0%	181.11	100.0%

* Fewer than 3 cases in that cell

Source: Resource Utilization Study, Facility Accounting Records, Medicare Cost Reports

- For patients treated in the IP setting, the largest proportion of cost (37.4% - 40.9%) was incurred in the preoperative phase as a result of the cost of laboratory tests or the overnight stay in the hospital. Also, a larger proportion of cost (22.8% - 26.7%) was incurred in the recuperative phase as a result of the overnight stay after surgery was performed.
- In contrast, the ambulatory surgical settings experienced most of the costs in the operative phase (44.5% - 63.5%)
- Only a very small proportion of cost was incurred in the screening phase (less than 6.0% for any procedure in any setting) and, similarly, for the ambulatory setting very little cost was incurred in the recuperative phase.

Weighted Procedure Comparisons

Cost comparisons were made between surgical settings for sets of individual procedures weighted by their frequency of occurrence in the FSASC setting in 1974 to approximate aggregate cost differences between the surgical settings. The analysis in the previous section was performed on a procedure-specific basis. However, the weighting procedure used in the analysis discussed in this section took into account the relative frequencies of the individual procedures. Thus, it may be seen that if a large cost difference was observed between settings for a relatively infrequently performed procedure, the resultant savings may not be as significant as a smaller difference observed for a high volume procedure. The difference in aggregate cost between settings for a set of weighted procedures reflects, therefore, the percent decrease (or increase) in costs that would have occurred if the same set of procedures would have been performed in the alternative setting with the same relative frequency distribution of procedures. It should be noted that this analysis assumed that the cost characteristics, including indirect cost rates, of the surgical settings would remain constant.

Exhibit III-27 shows the procedure volume weights applied to the observed average costs and the weighted average costs by procedure and surgical setting. The twelve procedures included

Exhibit III-27

Average Cost and Average Cost Weighted by Frequency of Occurrence in the FSASC Setting in 1974 by Procedure and Surgical Setting

SURGICAL SETTING / PROCEDURE	IP		OP		HAASC		FSASC		
	AVERAGE COST	WEIGHTED AVERAGE COST	AVERAGE COST	WEIGHTED AVERAGE COST	AVERAGE COST	WEIGHTED AVERAGE COST	AVERAGE COST	WEIGHTED AVERAGE COST	PROPORTION OF PATIENTS IN FSASC SETTING 1974
1. Myringotomy and Adenoidectomy	$273.49	$ 11.49	$134.67	$ 5.66	$190.82	$ 8.01	$130.28	$ 5.47	4.2
2. Tonsillectomy and Adenoidectomy	285.40	2.85	·		282.77	2.83	155.80	1.56	1.0
3. Dilation and Curettage	297.96	62.27	135.45	28.31	150.27	31.41	119.77	25.03	20.9
4. Laparoscopy With B.T.E.	280.79	41.28	154.67	22.74	131.58	19.34	131.30	19.39	14.7
5. Breast Mass Excision	408.39	11.43	·	·	223.11	6.25	157.71	4.42	2.8
6. Ganglionectomy	313.86	5.65	·		190.62	3.43	144.97	2.61	1.8
7. Inguinal Herniorrhaphy	271.76	10.33	·	·			156.15	5.93	3.8
8. Vasectomy	-	-	-	-	194.67	1.75	133.18	1.20	0.9
9. Circumcision	·		-	-	129.18	1.55	138.94	1.67	1.2
10. Augmentation Mammoplasty	·	·	169.27	1.86	261.06	2.87	200.61	2.21	1.1
11. Advancement or Recession of Eye Muscle	262.38	4.72	·	·	198.80	3.58	147.07	2.65	1.8
12. Excision of Lipoma Or Sebaceous Cyst	·	·	·	·	169.36	11.18	140.13	9.25	6.6

-Indicates fewer than 3 cases
· indicates no cases

Source: Resource Utility Study, Facility Accounting Records, Medicare Cost Reports in the analysis made up 60.8% of the total case load of the FSASC in 1974 with two procedures, dilation and curettage and laparoscopy with B.T.C., accounting for over thirty-five percent of the procedure volume. The weighted costs in this exhibit were used to calculate the aggregate costs for the sets of procedures for which the inter-setting comparisons in Exhibit III-28 were computed. As an example of this process, the eight values in Exhibit III-27 that can be compared across procedures between the IP and FSASC settings were summed. These totals were $150.02 and $67.06 for the IP and FSASC settings, respectively. As can be seen from the exhibit the FSASC setting was found to be 55.3% less costly than the IP setting for the set of eight comparable procedures. The differences are somewhat less when the FSASC was compared to the alternative ambulatory settings; however, the savings were still substantial with the FSASC exhibiting 11.0% less cost than the OP setting for four comparable procedures and 18.2% less cost than the HAASC setting for the set of eleven comparable procedures. It should be emphasized that these differences are not procedure-specific, as shown in previous sections, but a weighted aggregate across all procedures that can be compared between particular pairs of settings.

The HAASC setting also proved to be less costly than the IP setting by 46.4% for seven comparable procedures as did the OP setting (50.7%) for three procedures. However, the HAASC setting was found to be somewhat more costly (5.2%) than the OP setting for the set of four comparable procedures included in the analysis.

Summary of Findings. The analysis of aggregated procedure cost comparisons weighted by the relative frequency of procedures in the FSASC setting provided the most comprehensive study of the differences in facility incurred cost by surgical setting. It was found that:

- For the same proportionate mix of eight comparable procedures, the FSASC setting was 55.3% less costly than the IP setting for facility incurred costs.
- Compared to the OP setting, the FSASC was 11.0% less costly for a set of four comparable procedures.

Exhibit III-28

Aggregate Costs and Percent Difference Between Surgical Settings for Sets of Procedures Weighted by Frequency of Occurence in the FSASC Setting in 1974

Surgical Setting		No. Procedures for Comparison	Aggregate Cost Setting A	Aggregate Cost Setting B	Percent Difference in Cost $\frac{B-A}{A}$
A	B				
IP	FSASC	8	$150.02	$67.06	-55.3%
OP	FSASC	4	58.57	52.10	-11.0%
HAASC	FSASC	11	92.20	75.46	-18.2%
OP	HAASC	4	58.57	61.63	+ 5.2%
IP	HAASC	7	139.69	74.85	-46.4%
IP	OP	3	115.04	56.71	-50.7%

Source: Facility Accounting Records, Resource Utilization Study, Medical Record Abstracts, Patient Interviews

- The FSASC setting was found to incur 18.2% less facility cost than the HAASC setting for eleven comparable procedures.

- For a set of four comparable procedures the HAASC setting was found to be 5.2% more costly than the OP surgical setting.

- When compared to the IP setting it was observed that the OP setting was 50.7% less costly for three comparable procedures and the HAASC setting was 46.4% less costly for seven comparable procedures.

Opportunity Cost

The analysis of opportunity cost was limited to an examination of the time spent by patients having surgery in the alternative surgical settings in obtaining services. Patients were also questioned as to the amount of income lost and the number of days lost from work during the surgical episode. However, the analysis of the "opportunity" cost was severely constrained as a result of two factors.

First, the selection of the twelve procedures included in the study resulted in four procedures (dilation and curettage, laparoscopy with B.T.C., breast mass excision, and augmentation mammoplasty) that were performed exclusively on females. The dilation and curettage and laparoscopy with B.T.C. procedures were the two highest frequency procedures included in the study. As a result, the majority of patients in the sample were female (more than 70%) and a significant proportion of the women having the procedures reported that they were not employed outside of the home with, consequently, no lost income or lost employed work days associated with the surgery.

In addition to the problem for the opportunity cost measurement of a high proportion of women in the sample, four of the procedures were routinely performed on children (myringotomy with adenoidectomy, tonsillectomy and adenoidectomy, inguinal herniorrhaphy, and advancement or recession of eye muscle). These patients also experienced no direct income loss or work days lost as a result of the surgical episode. As a result, it would have been impossible to calculate an accurate and useful equivalent of lost income for a significant proportion of the sample.

In order to partially correct these problems and to make the study as comprehensive as possible, the definition of opportunity cost was expanded to include lost income or days experienced by family members or friends in assisting the patient during the surgical episode. However, the major focus of the opportunity cost analysis was on the time spent by patients in the facility in which surgery was performed and in obtaining services prior to admission and after discharge from the facility.

Time Spent in Facility or Disabled As a Result of the Surgical Episode. Exhibit III-29 presents the average number of days the patients in the sample spent in the surgical facility and the average number of days the patients reported experiencing a totally or partially disabled condition as a result of the surgery. Apart from the obvious finding that the patients having surgery in an IP setting spent more time in the surgical facility and, therefore, exerienced a greater opportunity cost, no other consistent pattern across settings was readily discernable. For three of the four comparable procedures the total facility and disabled days were less in the FSASC setting than in the IP setting. Similarly for three of the four comparable procedures the total days were less in the HAASC setting time in the IP setting. Only two procedures were comparable between the IP and OP setttings. For myringotomy and adenoidectomy the total days were less in the OP than in the IP setting. For dilation and curettage it appeared that the OP patients experienced more combined facility and disability days on the average than did the IP patients. Again, no consistent pattern emerged when the HAASC and FSASC settings were compared. Of the ten comparable procedures, five showed more days in the HAASC setting and five showed more days in the FSASC setting. For the two most frequently performed ambulatory procedures, dilation and curettage and laparoscopy with B.T.C., patients having surgery in the FSASC setting appeared to require, on the average, a somewhat greater recuperation time than patients treated in the HAASC setting (5.7 total days in FSASC and 2.4 total days in the HAASC for dilation and curettage; 4.4 total days in the FSASC and 3.1 total days in the HAASC for laparoscopy with B.T.C.). An

Exhibit III-29

Average Total Number of Days Patient Spent in Surgical Facility and Disabled After Surgery by Procedure and Surgical Setting

SURGICAL SETTING / PROCEDURE	IP			OP			HAASC			FSASC		
	FACILITY DAYS	POST SURGERY DISABILITY DAYS	TOTAL DAYS	FACILITY DAYS	POST SURGERY DISABILITY DAYS	TOTAL DAYS	FACILITY DAYS	POST SURGERY DISABILITY DAYS	TOTAL DAYS	FACILITY DAYS	POST SURGERY DISABILITY DAYS	TOTAL DAYS
1. Myringotomy and Adenoidectomy	1.7	4.7	6.4	.3	1.0	1.3	.2	3.6	3.8	.1	1.0	1.1
2. Tonsillectomy and Adenoidectomy	2.0	7.2	9.2	*	*	*	1.0	9.4	10.4	.2	5.2	5.4
3. Dilation and Curettage	1.7	7.0	8.7	.3	10.2	10.5	.1	2.3	2.4	.1	5.6	5.7
4. Laparoscopy With B.T.C.	-	-	-	.2	7.7	7.9	.1	3.0	3.1	.1	4.3	4.4
5 Breast Mass Excision	2.4	7.9	10.3	*	*	*	.2	6.2	6.4	.1	6.4	6.5
6. Ganglionectomy	-	-	-	*	*	*	.1	9.4	9.5	.1	17.3	17.4
7. Inguinal Herniorrhaphy	-	-	-	*	*	*	*	*	*	.1	3.4	3.5
8. Vasectomy	-	-	-	-	-	-	.2	4.0	4.2	.1	2.7	2.8
9. Circumcision	*	*	*	-	-	-	-	-	-	.1	4.2	4.3
10. Augmentation Mammoplasty	*	*	*	.2	6.0	6.2	.2	28.8	30.0	.2	14.0	14.2
11. Advancement or Recession of Eye Muscle	1.7	3.3	5.0	*	*	*	.1	4.4	4.5	.2	5.9	6.1
12. Excision of Lipoma or Sebaceous Cyst	*	*	*	*	*	*	.1	8.9	9.0	.1	6.0	6.1

*Fewer than 3 cases

Source: Resource Utilization Study, Facility Accounting Records, Medicare Cost Reports

unexplained finding is the considerably longer total time reported for patients having these two procedures in the OP setting. Total time was reported as almost twice as long for these procedures in this setting than in the alternative ambulatory surgical center settings.

It would appear that, in terms of total time spent in the facility or disabled as a result of the surgical episode, patients having surgery in the ambulatory setting generally experienced less total time than patients treated in the IP setting. However, there was apparently no significant advantage of one ambulatory surgical center setting over another across the mix of procedures included in the study. Comparison of the OP setting with the HAASC and FSASC setting showed significantly greater time spent by patients in the OP setting for the two highest volume procedures.

Time Spent Obtaining Services Prior to Admission and After Discharge from the Facility. Exhibit III-30 shows the time spent by the patients in obtaining services by procedure and surgical setting. Of the five comparable procedures performed in the IP setting, three, myringotomy with adenoidectomy, tonsillectomy and adenoidectomy, and advancement or recession of eye muscle, required more time spent obtaining services before and after surgery in the IP setting than in any of the ambulatory settings. Dilation and curettage patients in the IP setting, on the average, spent more time than OP setting patients but less time than patients in either the HAASC or FSASC setting. Patients having breast mass excisions in the IP setting spent more time in obtaining services before and after surgery than patients in the HAASC setting and less time than patients in the FSASC setting.

For three of four comparable procedures, patients in the OP setting spent more time in obtaining services than patients in the alternative ambulatory surgical settings. Only for myringotomy with adenoidectomy was the time spent obtaining services less in the OP setting. Comparison of the HAASC and FSASC settings showed no consistent pattern. For four of the ten comparable procedures the patients in the FSASC setting spent less time obtaining services before and after the surgery than did patients in the HAASC setting. In six procedures the opposite relationship was found.

Exhibit III-30

Average Number of Hours Spent Obtaining Services Before Admission to And After Discharge From Facility in Which Surgery was Performed, by Procedure and Surgical Setting

SURGICAL SETTING / PROCEDURE	IP			OP			HAASC			FSASC		
	BEFORE ADMISSION	AFTER DISCHARGE	TOTAL HOURS	BEFORE ADMISSION	AFTER DISCHARGE	TOTAL HOURS	BEFORE ADMISSION	AFTER DISCHARGE	TOTAL HOURS	BEFORE ADMISSION	AFTER DISCHARGE	TOTAL HOURS
1. Myringotomy and Adenoidectomy	4.5	6.5	11.0	1.7	1.0	2.7	2.7	3.7	6.4	3.3	3.5	6.8
2. Tonsillectomy and Adenoidectomy	3.0	1.7	4.7	*	*	*	2.2	2.1	4.3	2.5	1.2	3.7
3. Dilation and Curettage	1.9	1.4	3.3	5.3	3.6	8.9	1.9	2.3	4.2	2.3	2.6	4.9
4. Laparoscopy With B.T.C.	-	-	-	4.7	.8	5.5	2.4	1.9	4.3	2.1	1.4	3.5
5. Breast Mass Excision	2.4	2.7	5.1	*	*	*	2.8	1.7	4.5	3.5	3.6	7.1
6. Ganglionectomy	-	-	-	*	*	*	2.7	3.0	5.7	3.0	6.5	9.5
7. Inguinal Herniorrhaphy	-	-	-	*	*	*	*	*	*	2.5	5.7	8.2
8. Vasectomy	-	-	-	-	-	-	1.7	1.7	3.4	1.5	1.2	2.7
9. Circumcision	*	*	*	-	-	-	-	-	-	2.0	3.7	5.7
10. Augmentation Mammoplasty	*	*	*	3.8	9.5	13.3	2.6	5.8	8.4	2.7	5.1	7.8
11. Advancement or Recession of Eye Muscle	5.9	7.0	12.9	*	*	*	4.5	5.7	10.2	4.6	6.3	10.9
12. Excision of Lipoma or Sebaceous Cyst	*	*	*	*	*	*	2.1	2.6	4.7	2.6	4.5	7.1

*Fewer than 3 cases

Source: Resource Utilization Study, Facility Accounting Records, Medicare Cost Reports

Overall, for the set of procedures included there appeared to be little, if any difference between the IP, HAASC, and FSASC settings in the average time spent by patients in obtaining services before and after surgery. However, it appeared that for OP patients, for the limited number of comparable procedures, more time was spent obtaining services than for patients in any of the alternative ambulatory settings.

Time and Income Lost from Regular Employment. As previously discussed, the analysis of work time lost and income lost was severely limited in this study. However, from the patient interview responses the average number of days lost and average income lost was calculated for comparable procedures and is presented in Exhibits III-31 and III-32.

From the exhibit showing days lost, it may be seen that, on the average, for most procedures very few work days were lost by patients or their family or friends as a result of the surgical episode. In only four procedures were two or more work days lost, on the average, as a result of the surgical episode. These procedures and setting were:

- Breast Mass Excision - The IP setting experienced an average of 3.2 lost work days as compared to 1.1 in the HAASC and .5 in the FSASC
- Ganglionectomy - IP setting experienced an average of 9.0 days lost from work. The average in the HAASC setting was .2 days and in the FSASC setting 1.1 days.
- Circumcision - An average of 3.1 lost work days was observed for the FSASC setting.
- Augmentation Mammoplasty - More than two lost work days, on the average, were reported in all ambulatory settings with 2.6 days in OP, 4.3 days in HAASC, and 2.7 days in the FSASC.

Exhibit III-32 presents the average income lost by patients, family, and friends as a result of the surgical episode by procedure and surgical setting. Inspection of the distributions

Exhibit III-31

Average Number of Days Lost From Employment By Patient, Family, and Friends Because of Surgical Episode, by Procedure and Surgical Setting

SURGICAL SETTING / PROCEDURE	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
1. Myringotomy and Adenoidectomy	.1	.2	17	.2	.4	6	.6	1.2	28	.9	1.9	30
2. Tonsillectomy and Adenoidectomy	1.0	1.2	19	*	*	*	.7	1.1	23	.9	.7	15
3. Dilation and Curettage	1.4	1.8	18	.9	.9	18	1.2	3.3	63	1.6	4.7	61
4. Laparoscopy With B.T.C.	0.0	0.0	3	1.1	1.1	37	.7	2.7	36	.9	.9	61
5. Breast Mass Excision	3.2	3.7	14	*	*	*	1.1	2.1	33	.5	1.2	35
6. Ganglionectomy	9.0	5.2	3	*	*	*	.2	.7	29	1.1	1.7	37
7. Inguinal Herniorrhaphy	0.0	0.0	6	*	*	*	*		*	.9	1.0	38
8. Vasectomy	-	-	-	-	-	-	1.0	.6	7	.4	.9	41
9. Circumcision	*	*	*	-	-	-	-	-	-	3.1	2.0	12
10. Augmentation Mammoplasty	*	*	*	2.6	3.2	7	4.3	10.3	27	2.7	2.6	25
11. Advancement or Recession of Eye Muscle	0.0	0.0	17	*	*	*	1.0	2.8	24	.4	.8	27
12. Excision of Lipoma or Sebaceous Cyst	*	*	*	*	*	*	1.1	.9	14	2.5	9.2	27

*Fewer than 3 cases

Source: Patient Interview Questionnaires

Exhibit III-32

Average Income Lost by Patient, Family, and Friends as a Result of Surgical Episode, By Procedure and Surgical Setting

SURGICAL SETTING / PROCEDURE	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
1. Myringotomy and Adenoidectomy	$ 6.88	$13.11	17	$ 6.81	$ 5.73	6	$ 8.69	$23.49	28	$ 7.42	$16.63	[illegible]
2. Tonsillectomy and Adenoidectomy	0.0	0.0	19				8.25	20.74	23	15.13	17.22	15
3. Dilation and Curettage	23.79	33.74	18	0.0	0.0	18	20.90	48.83	62	37.44	78.15	61
4. Laparoscopy With B.T.C.	0.0	0.0	3	10.58	9.91	37	24.24	64.10	35	14.91	26.30	61
5. Breast Mass Excision	24.04	43.70	13	*			44.54	86.61	33.	81.66	206.68	35
6. Ganglionectomy	-	-	-	*			10.77	18.90	23	6.42	12.36	36
7. Inguinal Herniorrhaphy	5.50	3.47	6	-	*					2.31	9.67	38
8. Vasectomy	-	-	-	-	-	-	0.0	0.0	7	12.85	30.26	41
9. Circumcision	*	*		-	-	-	0.0	0.0	3	55.75	59.33	12
10. Augmentation Mammoplasty	*	*	*	10.00	14.14	7	229.00	500.18	27	79.70	153.97	24
11. Advancement or Recession of Eye Muscle	20.08	14.31	17	*	*		43.25	91.32	24	2.30	6.00	27
12. Excision of Lipoma or Sebaceous Cyst	*		*	*	*	*	0.0	0.0	14	44.38	156.32	27

Source: Patient Interview Questionnaires

*Fewer than 3 cases

- No cases

and the relatively large standard deviations for most of the procedure-setting combinations revealed little in the way of a discernable pattern of income loss across settings with the exception that, for the four comparable procedures, the patients in the OP setting experienced less average income loss than patients in other surgical settings. This may, in part, be due to the inclusion of the county hospital which treats welfare patients as one of the OP settings. Comparison of the HAASC and FSASC settings also showed no consistent pattern with six of the eleven comparable procedures showing less income lost in the HAASC setting and five showing more. It would appear, that as far as average work days lost and income lost for the procedures included in the study, there is little or no difference between surgical settings.

Summary of Findings. From the analysis of opportunity cost and time lost it was found that:

- In terms of the combined total time spent in the facility in which surgery was performed and the time the patient was disabled after surgery, patients in the IP setting generally experienced a greater total time than patients treated in the ambulatory settings. However, there was apparently no significant difference among ambulatory settings in the time spent by patients except for a somewhat longer total time reported for OP setting patients for dilation and curettage and laparoscopy with B.T.C.

- There was no significant difference among the IP, HAASC, and FSASC settings for the amount of time spent by the patients in obtaining services before admission to or after discharge from the facility in which the surgery was performed. However, there was some indication that OP setting patients spent more time in obtaining services than patients in any of the alternative settings.

- Little or no difference was observed across surgical settings in work days or income lost by the patient, family, or friends as a result of the surgical episode for the procedures included in the study. None of the inter-setting differences for individual procedures were statistically significant, as a result of the relatively small differences in means and large standard deviations that were observed.

FINDINGS: MEDICARE PATIENT COST

It was not possible to conduct an in-depth cost analysis of surgeries performed on Medicare patients. Of the 900 patients observed in the resource utilization study only seventeen patients (1.9%) reported Medicare as the principal source of payment. Furthermore, these seventeen patients were distributed across procedures and surgical settings so that no procedure-setting combination had more than three observations. Therefore, any analysis performed on these patients may be grossly misleading because of the small number of observations and no confidence could be placed in the cost estimates. It should be noted that the small number of Medicare patient observations in the sample was not unexpected. Most of the procedures included in the study are not generally performed on Medicare patients including myringotomy with adenoidectomy, tonsillectomy and adenoidectomy, laparoscopy with B.T.C., inguinal herniorrhaphy, vasectomy, circumcision, augmentation mammoplasty and advancement or recession of eye muscle. In addition, the proportion of patients that were Medicare eligible having surgery in ambulatory settings was relatively small (less than 4% in both the HAASC and FSASC settings).

As a result of the above constraints, a limited analysis of Medicare Part A (facility) patient claims for selected years and surgical settings was performed to examine variations in average amounts claimed. It should be noted that the most severe limitation of this approach was the lack of comparability with the cost data developed in the other phases of the project and the inability to control for procedure mix.

Exhibit III-33 presents the distribution of Medicare surgical claims for thirteen facilities in Maricopa County by surgical setting for the years 1974, 1975, and 1976. These claims represent both major and minor surgeries performed on Medicare patients. As may be seen, the vast majority of the Medicare surgical patients in these years were treated in the IP setting. The proportion treated in ambulatory settings remained relatively constant over the period with a minor decline in the proportion noted in 1975. Together, the HAASC and FSASC settings made up only 6.2% of the total Medicare surgeries performed in the thirteen institutions in 1976.

Exhibit III-33

Number of Medicare Patient Surgical Claims By Setting and Year, 1974-1976

YEAR / SETTING	1974		1975		1976	
	N	%	N	%	N	%
IP	4,962	88.7	9,965	91.1	9,426	86.5
OP	409	7.3	514	4.7	791	7.3
HAASC	28	.5	127	1.2	282	2.6
FSASC	198	3.5	337	3.1	394	3.6
TOTAL	5,597	100.0%	10,943	100.1%	10,893	100.0

Source: Medicare Patient Surgical Claims Obtained From Arizona Blue Cross

A random sample of claims was drawn from each surgical setting proportionately by facility, for the years 1974, 1975 and 1976. The amount claimed was classified into operating room, laboratory, radiology, pharmacy and room charge according to the detail provided on the claims form. The detailed results of the analysis for 1976 is given in Exhibit III-34. As may be seen from the exhibit the average Medicare claim amount from the FSASC was significantly less ($p < .05$) than the claim amounts in the OP and HAASC settings. Furthermore, the average claim amount in the IP setting was almost twenty times the average amounts in the ambulatory settings. The high IP claim average is attributed, in part, to the inclusion of all IP Medicare surgical claims which included complex procedures that would not be performed on an outpatient basis and high risk patients who required hospitalization for surgery. Therefore, the comparison between the IP and the ambulatory settings is not particularly revealing because of potentially major differences in the mix of procedures performed.

Exhibit III-35 shows a comparison of the average Medicare surgical claim amount for the ambulatory surgical setting by charge category for the years 1974, 1975 and 1976. It may be seen that while the average claim amount in the FSASC setting remained relatively constant during the three year period, the average claim amount in both the OP and HAASC setting increased significantly. In the OP setting the average claim went from $97.91 in 1974 to $140.55 in 1976, an increase of 43.6%. The HAASC experienced a similar increase of 39.2% going from $110.66 to $154.01 over the same time period. Thus, the general pattern tended to support the findings in the procedure-specific analysis that showed that for all patients included in the specific procedure analysis, the FSASC setting was less costly than either the OP or HAASC setting.

To some extent, the differences in the average Medicare claim amount per patient among the ambulatory settings may result from differences in the mix of procedures performed in the ambulatory surgical settings. Exhibit III-36 gives the distribution of the fourteen surgical procedures most frequently performed on Medicare patients in 1976 in the three ambulatory settings. Substantial variation in the mix of procedures was noted with

Exhibit III-34

Medicare Surgical Claim Amount By Charge Category And
Surgical Setting: 1976

SETTING / CHARGE CATEGORY	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	N	$\bar{x}$	σ	N	$\bar{x}$	σ	N	$\bar{x}$	σ	N
Operating Room	$ 424.86	$ 585.85	200	$ 97.70	$125.00	100	$125.93	$39.10	30	-	-	-
Laboratory	277.10	294.13	200	21.23	31.02	100	20.17	19.77	30	-	-	-
Radiology	135.99	164.10	200	5.94	15.44	100	-	-	-	-	-	-
Pharmacy	271.51	442.56	200	13.71	23.45	100	-	-	-	-	-	-
Room Charge	911.05	864.18	200	-	-	-	-	-	-	-	-	-
Total	$2434.92	$2254.71	200	$140.55	$108.75	100	$154.01	$32.06	30	$115.59	$48.64	50

Source: Medicare Patient Surgical Claims Obtained From
Arizona Blue Cross

Exhibit III-35

Average Medicare Surgical Claim By Ambulatory Surgical Setting,
Charge Category, and Year: 1974-1976

YEAR / SETTING AND CHARGE CATEGORY	1974			1975			1976		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
OP SETTING:									
1. OR, Surgery, ER	$ 66.17	$70.78	100	$ 85.73	$74.00	100	$ 97.76	$125.00	100
2. Laboratory	14.38	21.76	100	23.13	27.38	100	21.23	31.02	100
3. Radiology	5.95	18.75	100	4.70	12.55	100	5.94	15.44	100
4. Pharmacy	3.38	6.38	100	4.25	7.49	100	13.71	23.45	100
5. Total	97.91	64.11	100	134.27	99.89	100	140.55	108.75	100
HAASC SETTING:									
1. OR, Surgery, ER	91.21	31.36	28	126.63	40.97	30	125.93	39.10	30
2. Laboratory	12.55	12.45	28	23.68	28.60	30	20.17	19.77	30
3. Radiology	1.96	7.24	28	1.23	4.70	30	-	-	-
4. Total	110.66	26.10	28	152.42	43.54	30	154.01	32.06	30
FSASC SETTING:									
1. Facility Fee	115.52	47.97	50	99.92	42.75	50	115.59	48.64	50

Source: Medicare Patient Surgical Claims obtained from Arizona Blue Cross.

Exhibit III-36

Distribution of Fourteen Surgical Procedures Frequently Performed On Medicare Patients, by Ambulatory Surgical Setting: 1976

	OP		HAASC		FSASC	
PROCEDURE	N	%	N	%	N	%
Pain Block	19	2.4	0	0.0	56	14.2
Infiltration	0	0.0	0	0.0	43	10.9
Excision of Lesion, Tissue Debridgement	192	24.3	12	4.3	41	10.4
Excision of Mass, Wart, Tumor Cyst	63	8.0	32	11.3	26	6.6
Dilation and Curettage	12	1.5	13	4.6	39	9.9
Excision of Basal Cell Carcinoma	32	4.0	11	3.9	24	6.1
Nerve Stimulation	0	0.0	0	0.0	17	4.3
Blepharoplasty	7	0.9	2	0.7	10	2.5
Biopsy, Miscellaneous	15	1.9	2	0.7	8	2.0
Breast Mass Excision, Biopsy	16	2.0	9	3.2	8	2.0
Removal of Hardware or Fixation Device	5	0.6	4	1.4	8	2.0
Photocoagulation	12	1.5	10	3.5	0	0.0
Cataract	18	2.3	0	0.0	0	0.0
Endoscopy Procedures	183	23.1	92	32.6	7	1.8
Other	217	27.5	95	33.8	107	27.3
	791	100.0%	282	100.0%	394	100.0%

Source: Medicare Patient Surgical Claims Obtained From Arizona Blue Cross

endoscopy procedures reported as the most frequently performed procedures in both the OP and HAASC settings representing 23.1% and 32.6% respectively of the Medicare surgery volume in these settings. Excision of lesion and excision of mass (wart, tumor, cyst, etc.), were the next most frequently performed procedures in the OP and HAASC setting. In the FSASC setting, only 1.8% of the 1976 Medicare surgery cases were endoscopy procedures, in sharp contrast to the other settings. Pain blocks and infiltration procedures were very frequently performed in the FSASC setting (14.2% and 10.9% respectively); however, these procedures were only infrequently performed in the OP setting (2.4%) and not found at all in the HAASC setting. Combined, excision of lesions and excision of masses and other abnormalities made up 17.0% of the FSASC Medicare surgery volume which was substantially less than the proportion in the OP setting and slightly more than in the HAASC setting. It should be noted that in the FSASC setting dilation and curettage made up a larger proportion of the case load (9.9%) than in either the OP setting (1.5%) or the HAASC setting (4.6%).

In part, the lower average claim amount in the FSASC setting might have been due to the higher frequency of pain block and infiltration procedures (which are relatively low charge procedures). The HAASC and OP settings were characterized by a higher proportion of miscellaneous excisions and endoscopies than the FSASC setting which may have served to increase the average Medicare claim amount in these hospital-based settings.

The Medicare claims for the most frequently performed comparable procedure, dilation and curettage, were analyzed to determine if differences in claim amounts could be detected among settings for the same surgical procedure. In 1975 all dilation and curettage procedure claims for Medicare patients from the OP, HAASC, and FSASC settings and approximately one-third of the claims for this procedure from the IP setting were examined. Exhibit III-37 presents the average claims amount by charge category and surgical setting for the dilation and curettage procedure. The average total claim amount was substantially different across settings with the IP setting claims almost three times the average claim amount in the ambulatory settings. The FSASC claim amount of $122.00 was observed to be 25.5% less than OP setting claim ($163.78) and 6.3% less than the average claim

Exhibit III-37

Average Claim For Medicare Patient Dilation And Curettage By Charge Category and Surgical Setting: 1975

SETTING / CHARGE CATEGORY	IP (n=23)2/	OP (n=6)1/	HAASC (n=7)1/	FSASC (n=50)1/
Operating/Recovery Room	$135.96	$124.23	$112.00	-
Laboratory	77.86	33.66	18.17	-
Radiology	21.62	0.00	0.00	-
Pharmacy	19.89	1.20	0.00	-
Other	31.01	4.69	0.00	-
Room Charge	175.59	0.00	0.00	-
Total	$461.93	$163.78	$130.17	$122.00

1/Includes all medicare patients having the procedure in the surgical setting in 1975.

2/Approximately a one-third sample of patients with the procedure.

Source: Medicare Patient Surgical Claims Obtained From Arizona Blue Cross

in the HAASC setting ($130.17). It should be noted that although radiology charges were incurred in the IP setting, none were incurred in the OP, HAASC, or FSASC setting for this procedure. In addition, the differences in laboratory charges (which included EKG) among settings were substantial with the IP and OP settings reporting more average claim amount than the HAASC setting. The average length of stay in the IP setting for Medicare patients having the dilation and curettage was 2.5 days, which is somewhat longer than the average length of stay reported for the non-Medicare patient included in the sample for the previously discussed procedure-specific analysis.

Summary of Findings. Because of the very limited nature of the analysis of Medicare patient surgical cost the findings only address the difference observed in Medicare claims by surgical setting.

- Of all Medicare patients in thirteen facilities in Maricopa County undergoing surgery in 1976, only 13.5% of the patients had the surgery performed in an ambulatory surgical setting and only 6.2% of the patients had surgery performed in either the HAASC or FSASC setting.

- The average Medicare claim for surgery performed in the FSASC setting was $115.59 in 1976. This is significantly less ($p < .05$) than the average claim amount in either the HAASC setting ($154.01) or the OP setting ($140.55).

- Whereas the average Medicare claim amount in the FSASC setting remained relatively constant over the period 1974 to 1976, the average claim in the OP setting increased by 43.6% and by 39.2% in the HAASC setting.

- The mix of procedures was found to differ substantially among the ambulatory surgical settings. Endoscopies were the most frequently performed procedures on Medicare patients in the OP and HAASC settings accounting for 27.5% and 33.8% of the surgery volumes respectively. Pain blocks and infiltration procedures were the most frequently performed Medicare procedures in the FSASC setting making up 25.1% of the procedure volume. The relatively higher charge for the endoscopy procedures and lower charge for the pain blocks and infiltration may account for some of the observed difference in average Medicare claim amount between the FSASC and the hospital based ambulatory settings.

- Analysis of the Medicare claims for dilation and curettage procedures performed in 1975 showed the average claim in the IP setting for a dilation and curettage was more than three times the average claim in the FSASC setting. The average FSASC setting claim amount of $122.00 was 25.5% less than the average OP setting claim ($163.78) and 6.2% less than the average claim in the HAASC setting ($130.17).

SUMMARY OF COST FINDINGS

This section provides a summary of the findings relating to surgical cost presented earlier in this chapter. Overall, surgical costs by procedure were generally found to be lower in the FSASC setting than in the other surgical settings. Part of the observed difference was found to be due to a much lower expense for routine laboratory work. An additional part of the lower FSASC cost was due to the lower level of staff labor cost per procedure. The differences in cost, largest in the case of the IP-FSASC comparison, were detected in the procedure-specific analysis of total procedure cost, facility incurred cost, and aggregated procedure cost (weighted by the relative frequency of procedure performance). A summary of specific findings documenting the generally lower surgical costs in the FSASC setting are presented below.

Patient Care Policies (as they affect costs)

The following findings may be summarized from the analysis of institutional policies affecting cost:

- The principal differences in patient care policy between the inpatient and ambulatory settings is the overnight stay component of the inpatient surgical episode. For the facilities included in the study the cost impact of the use of a general nursing ward for two nights ranged between $128.88 to $183.80.

- As measured by charges, routine clinical laboratory services were most expensive in the IP setting, with a facility average of $23.81; less expensive in the HAASC settings with a facility average of $16.98; and least expensive in the FSASC setting where no charge was made. If a charge was made in the FSASC setting comparable with the per test charge in the other surgical facilities, the charge would be approximately $7.98. The difference in the total charges among settings may be attributed to the different mix of tests routinely performed in the settings and differences in the per test charge structure.

- The charge for microscopic pathology examination of tissue and for frozen section was found to vary substantially across facilities, especially between the FSASC setting and the hospital-based settings. The average charge for a frozen section in a hospital-based setting was $39.38 compared with $12.50 in the FSASC setting.

- Chest x-rays were found to be not routinely required in the HAASC and FSASC surgical settings. However in the IP settings and to a lesser extent in the OP setting radiology examinations were used with charges ranging from $7.00 to $12.95 for a single view chest x-ray and from $11.00 to $25.90 for a two view chest x-ray.

- The cost of medications varied somewhat among surgical facilities and setting with the FSASC setting paying more for those items which the other facilities generally purchased through the Arizona Central Buying Service such as intravenous solutions (the FSASC is not a member of the service). For other medications the FSASC purchased items near or below the cost observed for the other facilities.

Staff Utilization

With regard to staff utilization it was found:

- All of the IP/OP facility-settings and one of the HAASC settings utilized operating room technicians between 10.4% and 38.1% of the total nursing staff time in the operative phase. The FSASC employed only RNs in both the operative and post-operative phases.

- LPNs were not used in either the HAASC or the FSASC setting. However four of the six IP/OP settings employed LPNs in the post operative phase. The proportion of total nursing time spent by LPN's ranged from 21.7% to 46.3%.

- Distribution of nursing staff time by function in the operative phase did not vary substantially across surgical settings. However, it was observed that a somewhat greater proportion of total staff time was spent directly with patients in the IP/OP setting than in the HAASC or FSASC settings, perhaps reflecting the more complex surgical case mix in the IP setting requiring more staff time per patient in the operative phase.

- In the post-operative phase the staff in the ambulatory surgical centers appeared to spend somewhat more time active in patient-related activities and less time "on-call" than in the IP/OP settings.

Indirect Costs

The principal finding with regard to indirect costs may be summarized as follows:

- The magnitude and composition of indirect costs varied sharply among facilities. There differences may be attributable to differences in procedure mix and accounting practice as well as real variation in costs. The examination of indirect cost rates is primarily important as an input to the procedure specific cost analysis which follows.

Total and Facility Service Cost

With respect to the total costs and the total facility incurred cost for the surgical episode, it was found that:

- With the exception of three procedures where the physician's charge could not be estimated, the FSASC setting was found to experience less average total cost than the IP setting for four out of five comparable procedures. The savings for these four procedures ranged from 18.6% for tonsillectomy and adenoidectomy to 38.7% for breast mass excision. The differences in total costs between the IP and FSASC settings were statistically significant for the four procedures with $p \leq .05$.

- Surgery performed in the FSASC setting was found to incur less average total cost than surgery performed in the HAASC setting for ten of eleven comparable procedures. The savings ranged from 2.8% for a laparoscopy with B.T.C. to 23.6% for a tonsillectomy and adenoidectomy. Five of the ten differences in cost were significantly different at $p < .05$. The total costs for breast mass excision were somewhat higher in the FSASC setting than in the HAASC setting but the differences was not statistically significant.

- For the three comparable procedures performed in the OP setting, the FSASC setting was observed to have less average total cost for all three, with differences of 2.5% for myringotomy with adenoidectomy, 5.6% for dilation and curettage and 12.2% for augmentation mammoplasty.

- In terms of facility incurred costs only (excluding physician charges and patient costs before and after the stage at the surgical facility), the FSASC setting was less costly than IP setting for all eight comparable procedures included in the study. The percent differences ranged from 42.5% for inguinal herniorrhaphy to 61.4% for breast mass excision. The differences were statistically significant with $p \leq .05$.

- The FSASC setting was also observed to be less costly than the OP setting for three of four comparable procedures; however, only the 11.6% difference for dilation and curettage and 14.7% difference for laparoscopy with B.T.C. were statistically significant. The facility cost of an augmentation mammoplasty was found to be 18.5% more costly in the FSASC setting than in the OP setting.

- When the facility cost was compared for the HAASC and FSASC settings, the cost in the FSASC setting was found to be lower for nine of eleven comparable procedures. The percent difference ranged from 17.3% for excision of lipoma or sebaceous cyst to 44.9% for tonsillectomy and adenoidectomy. Differences for these nine procedures were statistically significant with $p \leq .05$. Only two of the procedures included in the study were found to have higher facility costs in the FSASC setting than in the HAASC setting (laparoscopy with B.T.C. and circumcision). However, the difference was not statistically significant.

Components of Cost

With respect to the components of surgical cost it was found:

- The physician charge for professional services was found to be the largest single component of the cost of surgery accounting for one-third to two-thirds of the total surgical episode cost. With only minor exceptions, the physician charge was not found to vary significantly across surgical settings.

- Indirect costs were the second largest cost of the surgical episodes and generally showed as much variation among procedures as among settings. The OP setting however, seemed to experience somewhat lower indirect costs than the other ambulatory settings.

- Staff labor costs were observed to be lower for most procedures in the FSASC setting than in the alternative surgical settings. Staff labor costs were substantially higher in the IP setting than in the ambulatory settings as a result of the general nursing ward costs incurred.

- Supplies costs and laboratory, radiology, and pathology costs were all observed to be lower in the FSASC setting than in the alternative hosptial-based settings for most procedures.

- Little variation across settings was observed for either medication or anesthetic supplies cost.

Cost by Phase

Three principal findings emerged from the analysis of surgical cost by phase for four selected procedures.

- For patients treated in the IP setting, the largest proportion of cost (37.4% - 40.9%) was incurred in the preoperative phase as a result of the cost of laboratory tests or the overnight stay in the hospital. Also, a larger proportion of cost (22.8% - 26.7%) was incurred in the recuperative phase as a result of the overnight stay after surgery was performed.
- In contrast, the ambulatory surgical settings experienced most of the costs in the operative phase (44.5% - 63.5%)
- Only a very small proportion of cost was incurred in the screening phase (less than 6.0% for any procedure in any setting) and, similarly, for the ambulatory setting very little cost was incurred in the recuperative phase.

Aggregated Procedure Cost

The analysis of aggregated procedure cost comparisons weighted by the relative frequency of procedures in the FSASC setting provided the most comprehensive study of the differences in facility incurred cost by surgical setting. It was found that:

- For the same proportionate mix of eight comparable procedures, the FSASC setting was 55.3% less costly than the IP setting for facility incurred costs.
- Compared to the OP setting, the FSASC was 11.0% less costly for a set of four comparable procedures.
- The FSASC setting was found to incur 18.2% less facility cost than the HAASC setting for eleven comparable procedures.
- For a set of four comparable procedures the HAASC setting was found to be 5.2% more costly than the OP surgical setting.

- When compared to the IP setting it was observed that the OP setting was 50.7% less costly for three comparable procedures and the HAASC setting was 46.4% less costly for seven comparable procedures.

Opportunity Cost

From the analysis of opportunity cost and time lost it was found that:

- In terms of the combined total time spent in the facility in which surgery was performed and the time the patient was disabled after surgery, patients in the IP setting generally experienced a greater total time than patients treated in the ambulatory settings. However, there was apparently no significant difference among ambulatory settings in the time spent by patients except for a somewhat longer total time reported for OP setting patients for dilation and curettage and laparcscopy with B.T.C.

- There was no significant difference among the IP, HAASC, and FSASC settings for the amount of time spent by the patients in obtaining services before admission to or after discharge from the facility in which the surgery was performed. However, there was some indication that OP setting patients spent more time in obtaining services than patients in any of the alternative settings.

- Little or no difference was observed across surgical settings in work days or income lost by the patient, family, or friends as a result of the surgical episode for the procedures included in the study. None of the inter-setting differences for individual procedures were statistically significant, as a result of the relatively small differences in means and large standard deviations that were observed.

Medicare Program Cost

Because of the very limited nature of the analysis of Medicare patient surgical cost the findings only address the difference observed in Medicare claims by surgical setting.

- Of all Medicare patients in thirteen facilities in Maricopa County undergoing surgery in 1976, only 13.5% of the patients had the surgery performed in an ambulatory surgical setting and only 6.2% of the patients had surgery performed in either the HAASC or FSASC setting.

- The average Medicare claim for surgery performed in the FSASC setting was $115.59 in 1976. This is significantly less (p .05) than the average claim amount in either the HAASC setting ($154.01) or the OP setting ($140.55).

- Whereas the average Medicare claim amount in the FSASC setting remained relatively constant over the period 1974 to 1976, the average claim in the OP setting increased by 43.6% and by 39.2% in the HAASC setting.

- The mix of procedures was found to differ substantially among the ambulatory surgical settings. Endoscopies were the most frequently performed procedures on Medicare patients in the OP and HAASC settings accounting for 27.5% and 33.8% of the surgery volumes respectively. Pain blocks and infiltration procedures were the most frequently performed Medicare procedures in the FSASC setting making up 25.1% of the procedure volume. The relatively higher charge for the endoscopy procedures and lower charge for the pain blocks and infiltration may account for some of the observed difference in average Medicare claim amount between the FSASC and the hospital based ambulatory settings.

- Analysis of the Medicare claims for dilation and curettage procedures performed in 1975 reveals that the average claim in the IP setting for a dilation and curettage was more than three times the average claim in the FSASC setting. The average FSASC setting claim amount of $122.00 was 25.5% less than the average OP setting claim ($163.78) and 6.2% less than the average claim in the HAASC setting ($130.17).

IV. EVALUATION OF THE QUALITY OF SURGICAL CARE IN ALTERNATIVE SURGICAL SETTINGS

PURPOSE AND OBJECTIVES

The purpose of the quality of care evaluation was to determine whether or not the quality of surgical services varied by the type of setting in which the surgery was performed. This issue is particularly relevant to the question of federal reimbursement of freestanding ambulatory surgical centers (FSASCs). By definition, FSASCs are not owned or operated by a hospital or a health maintenance organization and, therefore, are not qualified providers of service under existing Medicare regulations. Surgical services have traditionally been provided either by a physician in conjunction with a hospital or by a physician in his private office for relatively minor types of procedures. The FSASC constitutes a new institutional type for the provision of services previously delivered in alternative settings. Because FSASCs are not designated as qualified providers of service, federal reimbursement for the facility fee of Medicare patients treated in the facility is currently not available except on a demonstration basis under Section 222 of Public Law 92-603.

In order to assess the status of FSASCs with regard to Medicare reimbursement, comparisons of the costs and quality of surgical services provided in these facilities must be made relative to the alternative surgical settings. If the cost of surgical services in the FSASC is equal to or less than the cost in alternative settings and if the quality of surgical services is as good or better than in alternative settings, then a case may be made for a change in federal regulations to support reimbursement for surgical services delivered in the FSASC setting. In the Chapter III the cost of surgical services was discussed in detail; in this chapter the quality of care in alternative surgical settings is assessed.

This chapter is organized in seven sections:

- An introduction, which details the purpose and objectives of the quality of care analysis
- A discussion of the analytical issues and limitations involved in assessing the quality of care in alternative surgical settings
- A summary of the methodology used in the quality assessment study (a more complete discussion of the methodology appears in the Appendix)
- The findings and conclusions of the analysis of the structural quality of alternative surgical settings including:
    - Compliance with state and local laws
    - Differences in the organizational and administrative structure
    - Organizational arrangements for utilization review
    - Physical characteristics of alternative surgical settings
    - Patient care policies of institutions
    - Patient care policies as expressed by a sample of Maricopa County physicians
- The findings and conclusions related to process quality characteristics including:
    - Patient flow in the surgical episode by phase
    - Demographic and medical characteristics of patients
    - Differences in treatment characteristics for twelve surgical procedures

- The outcome quality assessment findings and conclusions related to:
    - Surgical deaths
    - Unscheduled transfers from ambulatory to inpatient settings
    - Incidence of complications
    - Patient disability
    - Patient satisfaction
    - Physician satisfaction
- A summary of salient findings and conclusions.

Project Objectives

Quality of care assessment is a complex effort. Little is known about the relative importance of various characteristics of the health delivery systems and treatment modalities for specific conditions and the ultimate effect on the health status of the population. In the literature, three general areas have emerged as important to the study of quality of care: Structure, Process, and Outcome. It is evident that the areas are not mutually exclusive; however they do represent somewhat different aspects or dimensions of interactions between providers of care (both institutional and individual) and patients. The evaluation presented here sought to analyze the structural, process, and outcome characteristics of surgical care in alternative surgical settings.

Analysis of Structural Quality in Selected Institutions. The structural quality assessment consisted of several related areas including: the organizational characteristics of the institution for the provision of surgical services; the formally adopted policies and procedures for patient care and support services, the qualifications of the medical and nursing staff for the care of surgical patients, and the characteristics of the physical facility and its equipment. In the evaluation, the structural quality of seven institutions in the metropolitan Phoenix area was investigated with respect to the provision of surgical services to determine whether or not significant differences could be detected in the structural characteristics of the institutions that would affect the ability of the institutions to provide surgical services to minor surgery patients.

The structural quality assessment also included an analysis of the appropriateness of alternative surgical settings, the need for clinical laboratory tests, radiology services, cardiac monitoring, and pathology review of removed tissues as reported by a sample of Maricopa County physcians for the twelve specific procedures included in the study.

Analysis of Process Quality for Twelve Selected Surgical Procedures. Process quality consisted of the characteristics of the patient treatment from patient screening through recuperation during the surgical episode. In order to assess process quality, twelve surgical procedures were selected and a detailed study was made of the treatment characteristics and background medical characteristics of patients undergoing the procedures in the alternative surgical settings. The process quality assessment did not attempt to investigate or evaluate the actual surgical techniques employed in individual cases. Rather, the focus was on the assessment of patient risk and screening in the selection of surgical setting, indications for surgery, patient medical characteristics, laboratory and physical findings, medications used, selection of anesthesia type, operative findings and tissue examination, and patient time and personnel time in each phase of the surgical episode.

Analysis of Outcome Quality for Twelve Selected Surgical Procedures. Outcome quality assessment consisted of the review of the results of the surgical episode, the effect on the resolution of the problem for which the patient was referred for surgery, the complications resulting from the surgery during the operative, post operative, or recuperative phases of care and the patient's and physician's satisfaction with the surgical episode. The quality of care evaluation sought to determine whether differences in the outcome quality of surgical care could be detected across alternative surgical settings.

Comparisons of Characteristics of Patient Populations in Alternative Surgical Settings. In terms of the availability of alternative settings for surgery, the Phoenix area may be somewhat unique. With the opening of the Surgicenter, Inc., in

1970 and the development of two HAASCs and two other FSASCs in subsequent years, Phoenix has rapidly increased the experience and apparent acceptance of the ambulatory surgery concept for the physician community. Minor surgical procedures previously performed in an inpatient surgical setting are now likely to be performed on an ambulatory basis either in a hospital affiliated or freestanding surgical center setting. The shift in the distribution of surgical procedures by setting (discussed in detail in chapter V) has apparently changed the characteristics of the patient populations in the surgical settings. It appears that the healthy, low risk, minor surgical patients previously treated as inpatients are being shifted to ambulatory surgical settings while the higher risk, less healthy patients are remaining as inpatients for the minor surgical procedures. It would also appear that the proportion of higher risk, less healthy patients in the population for these minor procedures during the period of the study was relatively low. Therefore, an additional objective of the quality of care evaluation was to describe and compare the characteristics of the patient populations in alternative surgical settings for the twelve selected surgical procedures included in the study to determine what demographic and medical characteristics seem to make a patient a candidate for ambulatory rather than inpatient surgery.

ANALYTICAL ISSUES AND LIMITATIONS

Introduction

In the evaluation of the quality of surgical services in alternative settings, a number of important analytical and methodological issues must be considered. The background and understanding of these issues provides perspective as well as cautions in the interpretation of the findings of the quality of care analysis.

To a great extent, the analysis of surgical service quality was more difficult and complex from both a conceptual and a practical standpoint than was the cost evaluation. Whereas costs are additive and are subject to a conclusive statement such as one service is more (or less) costly than another, quality of care is a much less measurable concept and eludes any simple summation of end result.

Considerable debate currently exists in the medical community over what constitutes acceptable medical quality. Variations in the length of stay norms between regions for the same surgical procedure and diagnosis reflect the differences in local practice standards. Variations in the rates of surgical procedures even within a single state make the question of medical necessity even less tangible.[1]

For these and other reasons the quality of care study undertaken as part of this project had a limited focus and intent, and by explicit design focused on those issues most relevant to ambulatory surgery. The study accepted some of the basic precepts of quality of care assessment including the differentiation of structure, process, and outcome. However, in view of the overall purpose of the evaluation (and considering the state-of-the-art of quality evaluation) it was decided not to investigate the efficacy of the particular technique employed by the surgeon in performing the procedure or to conduct an extensive case-by-case clinical review.

The first set of issues discussed in the following paragraphs is primarily theoretical and consists of various components of a conceptual approach to an analysis of the quality of the surgical care. These issues are:

- Conceptual and practical implications of the structure, process, outcome approach
- Elective, minor surgery and patient risk
- Acceptability of alternative surgical settings for a surgical procedure

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[1] For examples and references to variations in surgical rates, see Wennberg, John E. "Using Localized, Population-Based Data in Evaluating Planning Problems," in U.S. D.H.E.W., Health Resources Administration, The Priorities of Section 1502, January, 1977, p. 79. (DHEW Publication No. HRA 77-641). See also Bunker, John P. "A Comparison of Operations and Surgeons in the United States and England and Wales." New England Journal of Medicine, Vol. 284 (January 15, 1970), p. 135-143. See also the annual NCHS publication: "Hospital Discharges and Length of Stay: Short-Stay Hospitals."

- Physician and patient decision making in the selection of surgical settings
- Intensity of surgical settings and differences in institutional objectives
- Institutional, physician, and patient responsibility in the surgical episode
- Patient and physician satisfaction with the surgical episode.

The second set of issues is related to the study methodology. This set focuses on the limitations of the design in the evaluation of the quality of care. The issues are as follows:

- Measurement problems related to quality of care assessment
- Problems in an outcome assessment for minor surgical procedures
- Limited samples of patients included in the study by procedure and setting
- Lack of comparable patient populations between settings.

Analytical Issues

Conceptual and Practical Implications of the Structure, Process, Outcome Approach. The major assumption of the quality of care methodology employed in the study is that the characteristics of the surgical episode, with respect to the effectiveness or appropriateness of the treatment provided to a patient, can be adequately evaluated by examining the structure, process, and outcome of the medical and surgical care. Although this three part distinction is widely used, the specific boundaries between structure and process, and process and outcome become blurred when a specific assessment of a surgical setting or a patient episode is carried out. Also, it is not clear that the three components, and what is included under their headings, are comprehensive of the subject of quality of care.

Most literature relates quality of health care to the observed, or expected change in the health status of the population or the individual patient. However, it is clear that health status is affected by other factors, many of which have nothing to do with the characteristics of the medical or surgical services provided to a patient. The most often mentioned factors include: heredity, life-style, environment, and the health system. It is difficult to draw a direct relationship between health status and the specifics of the structural characteristics of setting in which surgery is provided or the process characteristics of a surgery. Essentially, because the concept of health status is so elusive, a set of proxy measures of quality were selected that provided a limited understanding of the complex forces at work that influence the health and well-being of surgical patients.

The absence of deaths and the low complication rate related to these minor surgeries produced an inability to discriminate between surgical settings for minor surgical procedures on the outcome quality dimension. This reinforced the need to fall back on the structure, process and patient characteristic aspects of quality measurement previously discussed. This approach makes the assumption that the outcome quality is to some extent a function of structure, process, and patient characteristics. Although this relationship is implied in the subsequent analysis, it is beyond the scope of this study to determine the nature of this presumed relationship.

Elective Minor Surgery and Patient Risk. The procedures performed in ambulatory surgical settings are frequently described as elective surgery or minor surgery, or low risk surgery. However, it rapidly became clear that no such easy characterization of the types of cases may be made. Certainly, there appears to be a spectrum of risk for procedures performed in the ambulatory surgery setting and, furthermore, many procedures are not "minor" if the hospital definition of minor surgery is applied. In the course of our study, it was found that the definition of minor surgery was not consistent among institutions or even within institutions from year to year. The concept of elective surgery is also difficult to define in practice. Elective surgery is generally described as procedures that are performed at the option of the patient and that the postponment or the cancellation of the surgery is not injurious to the patient's health. The patient, of course, has the ultimate decision with regard to whether or not this surgery will be performed. A patient can decide not to have a complex serious surgery as well as not to have a benign sebaceous cyst removed. A complex surgery, for example a heart valve replacement, if postponed or not performed may, of course, have much more serious implications for the patient's health than the relatively simple excision of a cyst. However, there are several procedures where the implications for the patient's health are by no means clear. For example, a dilation and curettage as a diagnostic procedure may be used to identify uterine abnormalities. Although a condition may not indicate that the procedure is urgent or emergent, the decision not to have the procedure may mean that a cancerous or precancerous condition may go undetected. A parallel situation exists for excision of breast mass or breast biopsy. Thus, one must be careful when attempting to distinguish elective from non-elective surgery as a measure of the appropriateness of surgery or the selection of a surgical setting.

Because of the selection process that takes place in the screening of patients for ambulatory surgery, it is generally felt that ambulatory patients represent the lowest risk patient population of all surgery patients. While this may be true, it should be remembered that a majority of the ambulatory surgery is performed under a general anesthetic and that the use of general anesthetic introduces a risk component that must be considered in addition to specific patient characteristics and medical history. Indeed, it has been suggested that the major risk factor in some minor surgery is the anesthetic itself rather than the surgical procedure itself.

The Acceptability of Alternative Surgical Settings for a Surgical Procedure. The practice of ambulatory surgery, while not new, has only in recent years been expanded to encompass procedures that have been traditionaly performed in hospital inpatient settings. No firm, uniform set of decision criteria has been developed with respect to the appropriateness of particular surgical settings for specific procedures. Indeed, there is considerable debate over some procedures as to their adaptability to an ambulatory mode of treatment. It should be noted that the problem of acceptability has two sides. The first is the question of which procedures may be shifted (or not shifted) from the hospital inpatient setting to the ambulatory setting. The second is what procedures should be shifted (or not shifted) from the physician office setting to the institutional-based ambulatory setting.

Physician and Patient Decision Making in the Selection of Surgical Settings. One of the most interesting questions in the selection of a surgical setting is the relative importance of physician and patient factors in the choice of the surgical setting. When a procedure can legitimately be performed in either an inpatient or an outpatient setting, what role does the patient's preference have in the final selection? It has generally been considered that the patient is dominated by the physician's expertise and judgement in all aspects of treatment. However, as the type of surgery becomes less serious, it may be (although it was not examined by this study) that the patient plays a greater role in certain aspects of the treatment including the time of surgery and type of setting selected.

In addition, there is the question of how the physician arrives at his recommendation or preference for a surgical setting for less serious types of surgeries. In the absence of explicit criteria for these less serious surgeries, what information does the physician base his decision upon, including patient characteristics, procedure characteristics, previous experience with particular surgical settings, and personal convenience?

Intensity of Surgical Settings and Differences in Institutional Objectives. Embodied in the research design for the study was the concept of the intensity of the surgical setting. The intensity concept was based on the type of resources typically available within a given surgical setting. The five surgical settings in order of expected resource intensity are, therefore; Hospital Inpatient, Hospital Outpatient, HAASC, FSASC, and Physician's Office (these are discussed in detail in the Appendix). The difference in resource intensity may also mean that the resources are employed differently in the treatment of patients with a subsequent influence on the resultant cost of treatment and, perhaps, on the quality of patient care. The resource intensity, therefore, may influence the structural and process characteristics of the surgical services. It should also be noted that the differences in resource intensity and the associated differences in case mix and condition severity result in different sets of institutional objectives. Hospitals that have not developed HAASCs or an active outpatient surgery program do not necessarily consider outpatient surgical service as a principal focus of institutional concern. Frequently, this service is provided as an adjunct to the emergency room. When included within the IP service, it represents more of a disruption of the inpatient routine than a normal mode for delivery of surgical services. Whereas in the HAASC (to the extent that it is a separate unit) and in the FSASC the principal (and only) objective of these settings is providing ambulatory surgical services. The staff of these centers generally do not have competing demands for their time or for the resources used in the ambulatory surgical centers.

Institutional, Physician, and Patient Responsibilities in the Surgical Episode. As the study team spent time within institutions observing surgical care and later discussing the aspects of surgery services with facility administrators, physicians, and patients, it became clear that the success of the surgical episode was dependent upon a careful balance of responsibilities between the institution, the physician, and the patient. Furthermore, the selection of the surgical setting changed the mix of responsibilities, which could lead to differences in the outcomes of treatment. For example, the inpatient setting for minor surgery placed considerably more burden of responsibility on the institution than did the FSASC setting. In the inpatient setting, the institution is responsible for monitoring the patient during a significant portion of the recuperative phase. In the case of the FSASC setting, the patient and the physician carry that responsibility apart from any institutional involvement. In the analysis, the responsibilities of the institution, physican, and patient and the implications for the quality of care are examined in detail.

Patient and Physician Satisfaction With the Surgical Episode. Surgery is generally an unpleasant, painful and disturbing experience for the patient. It is obviously a disruption of normal routine and the submission of self control to the surgeon and the anesthesiologist and, to a lesser extent, the nursing staff of the institution. Therefore, the concept of satisfaction for the patient with the surgical episode presents some major theoretical and measurement difficulties. If sufficient time has elapsed, the patient may be able to assess the satisfaction with the results of the surgery apart from the painfulness of the process. If the components of the surgical process are specifically identified the patient may also be able to provide opinion information about the aspects of the process.

However, the patient may not be cognizant of many aspects of the process, for example, nursing care in the recovery room, because of the continuing effects of the anesthetic used in the surgery. Furthermore, the patient may not be able to assess the adequacy of services provided because of lack of knowledge of the requirements of the surgical process. All of these caveats apply to the interpretation of the patient satisfaction findings.

The physician satisfaction is a concept that is generally overlooked in the literature of health outcome satisfaction. Although most emphasis is placed on satisfaction from the consumer's viewpoint, the provider attitudes with respect to surgical settings are directly relevant to measuring the quality of services. For this reason, the study included a limited analysis of physician opinion and attitudes in the quality of care evaluation.

Methodological Issues

Problems in "Outcome" Assessment for "Minor" Surgical Procedures. The outcome of medical/surgical treatment has been characterized as consisting of the dimensions of Death, Disability, Disease, Disfunction, and Dissatisfaction. While it is obviously not the case that only a negative interpretation is to apply, these five "Ds" at least capture what is generally measured in outcome quality assessment. This approach presents major problems for examining the results of minor surgical services. The problem is one of sensitivity. It is not at all clear that these measures are sensitive to the differences in surgical outcomes for minor procedures. It is not expected that the types of procedures included in the study will result in death, disability, disease, or disfunction. The probability of major problems or complications occuring as a result of the surgical episode is so low that, given the sampling limitations, it is likely that any differences between surgical settings will go undetected if, indeed, they exist at all. For example, in the seven year experience of the FSASC and the five and four year histories of the two HAASCs included in the study, no deaths have occurred related to the surgical services. The dimension which is left as perhaps discriminating between settings is dissatisfaction/satisfaction. However, measures of dissatisfaction and satisfaction provide a relatively weak basis for outcome quality assessment and must be carefully interpreted in light of the expected absence of findings on the other major dimensions of outcome quality.

Measurement Problems Related to Quality of Care Assessment. The fundamental problems in the evaluation of quality of care are the validity and reliability of the measures that are selected to represent the components of quality. The sources of difficulty are of two general types. First, the measures themselves sometimes only peripherally relate to the component we are trying to measure. For example, a measure of the patient risk for a particular procedure is the pre-existing conditions of the patient. The measure employed is the presence or absence of pre-existing conditions of specific types. However, the actual determinant of risk with respect to pre-existing conditions is the severity of the condition rather than the presence or absence alone. It was not possible to assess the condition severity within the scope of this study and therefore, the simpler and less discriminating measure of presence or absence was used.

The second type of measurement difficulty is in the types and quality of data sources available from which to make the measurement. Although we were dealing with a single community of institutional and individual providers, the differences between providers with respect to the type of information and the detail of the information recorded on the source documentation were substantial. Although the health services in a community are frequently referred to as a system, there is no "system" of information retrieval that assures the researcher of comparability of data sources or even that the same type of data source exists within two institutions.

Limited samples of patients included in the study by procedure and setting. The sample design, discussed in detail in the methodological appendix, was based on the requirements for estimating the costs of surgery in alternative settings. In many instances the targeted number of patients for a particular procedure-setting combination was relatively small -- on the order of 15 to 50 patients. (This problem is quite severe for the inpatient sample because of the small number of patients identified having the candidate procedures.) This very small sample size for some procedures had implications for the quality study in that the variance in some of the measures used to assess quality was too large to provide an adequate estimate of the parameter in question. The ability to make comparisons between surgical settings for specific procedures was, therefore, quite constrained when the number of observations was small. Because of this, the quality analysis focused on several patient and treatment characteristics without respect to procedure type. The procedure-specific analysis focused, to a great extent, on four or five procedures where the number of observations by type of setting was sufficient for reliable estimates.

Inability to Match Patient Populations Across Settings. Early in the project effort, consideration was given to matching patients between surgical settings on a set of patient risk variables including age and medical characteristics. However, in light of the low frequency of many of the procedures of interest and the difficulty in specifying a priori the matching variables, this approach was dropped in the final research design. (It may not even have been feasible to assemble matched groups for some comparisons across settings due to differences in the underlying populations.) Consequently, the characteristics of the patient populations included in the sample by setting, especially inpatient versus the ambulatory settings, are different. To some extent, the design traded off the comparability of patients which, if achievable, would have been desirable in the cost analysis, for more information about the differential characteristics of the patient populations by type of surgical setting. Much of this additional information consisted of the demographic and medical characteristics of patients and was obtained primarily from the quality of care evaluation.

SUMMARY OF QUALITY STUDY METHODOLOGY

Introduction

This section summarizes the methodology used in assessing the quality of surgical services provided in surgical settings in the Phoenix area. In this section, we have not repeated information presented in Chapter III on aspects of the overall study design, much of which is also pertinent to the quality study. This information dealt with:

- Selection of surgical settings
- Selection of institutions
- Specification of surgical episode phases

- Selection of specific surgical procedures
- Selection of patients for the study.

Instead, we have presented a summary of the methodology specifically used for the quality study, details of which are presented in the Appendix.

The quality data collection methodology was designed to obtain information on the structural, process, and outcome aspects of quality as related to surgical services at the Phoenix site. The following sections discuss the data collection approach to each of these three major areas.

Structural Quality

The assessment of structural quality of surgical settings was conducted for all institutions participating in the evaluation at the Phoenix site. This evaluation was performed in the following surgical settings:

- Hospital Inpatient
- Traditional Hospital Outpatient
- Hospital Affiliated Ambulatory Surgical Center
- Free Standing Ambulatory Surgical Center.

A data collection instrument, the Facility Survey Report, was designed as the basis for the evaluation. The Facility Survey Report is essentially a modification of the Medicare Facility Survey and the Joint Commission on the Accreditation of Hospitals survey forms. The modifications were made to emphasize aspects of structural quality that related particularly to surgical services with more detailed questions on the regulations and policies of the Phoenix facilities governing the care of surgical patients. The Facility Survey Report was completed for each facility participating in the evaluation. In-depth interviews were conducted with facility representatives including the administrator, the medical records department supervisor, the head of the medical staff, the chief of surgery, and the chief of anesthesiology to complete the information items contained in the survey. The policy manuals, regulations and bylaws of the facility and the medical staff were also reviewed in detail and a sample of medical records from each facility was examined for form and content.

The structural quality evaluation examined the following major areas of facility organization and operations.

- Compliance with State and Local Laws
- Governing Body
- Medical Staff
- Medical Records Department
- Laboratories
- Radiology Department
- Complementary Departments (including Surgery, Anesthesiology, Operating and Recovery Rooms).

The compliance of the facility with a detailed set of standards and sub-factors under each of the major areas of the survey was assessed by the physician consultant. The complete Facility Survey forms used in the structural quality assessment are included in the Appendix to this report.

The analysis of the structural quality information was performed by the comparison of the organizational and operational characteristics of facilities across the four settings and the adherence to the standards and factors contained in the Medicare Facility Survey prototype form.

The Physician Questionnaire was used to gather information on the policies of surgical practice in the Phoenix area as perceived by a sample of physicians for the twelve surgical procedures included in the study. The evaluation required data on the implicitly or explictly used decision rules used to select among alternative surgical settings and the treatment characteristics and screening procedures recommended for patients having particular types of surgeries. The physician questionnaire requested specific information on the surgical setting preference, laboratory tests, patient monitoring, radiology, and conditions that would recommend inpatient or physician office surgical settings for the surgical procedure.

Process Quality

The process quality assessments examined a relatively limited set of factors concerning the surgical process itself. No attempt was made to assess the competency of the surgeon or the efficacy of the surgical technique employed to treat a specific case. The process quality assessment focused on the factors that determined the selection of the surgical setting for patients undergoing particular types of surgeries included in the evaluation, the types of laboratory and radiology tests performed on the patient prior to surgery, the medical characteristics of the patients in terms of pre-existing conditions and medications in current use, patient demographic characteristics, the use of medications and anesthesia type, and the operative and anesthesia time requirements.

Three primary data collection techniques were used to obtain the information required for the process quality analysis:

Medical Record Review. For each patient included in the study sample, the patient's medical record was reviewed by the data collection team[2] and a medical record abstract was completed. The medical record abstract was designed in conjunction with the physician advisor to review and record all relevant information pertaining to the surgical case. The Medical Record Abstract Form is presented in the Appendix. A comprehensive set of instructions and guidelines for completing the abstract was prepared and thoroughly reviewed with the abstracting team.[3] A set of test cases was abstracted and the validity and reliability of the abstracting process was assessed. Training continued until a high level of intercoder consistency was maintained. Bi-weekly meetings were held to discuss problems, coding conventions, and unusual cases.

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[2] The data collection, abstracting, and patient interview teams consisted entirely of Registered Nurses.

[3] Ibid.

Several problems were encountered with the categories for "indications for surgery" and "operative findings" necessitating substantial revision of these items to provide for additional valid response categories.

Patient Interview. The patient interview was used to obtain information from the patient that was not available by means of direct observation during the pre-operative, operative, and post-operative phases. The patient interview was also the only method by which the characteristics of patient care in the screening and recuperation phases were assessed. The patient interview was conducted on a face-to-face basis in the patient's home from one to three months after the surgery. All interview appointments were scheduled in advance and the patients were asked to have copies of all bills, receipts, or insurance forms relevant to the surgical episode ready for the interviewer[4] to review.

The interview instrument had three major sections. The first section assessed all services and charges incurred by the patient and his family during the surgical episode. This section of the interview established the referral date for surgery that marked the beginning of the screening phase and the date of return to normal activity that marked the end of the recuperation phase. The second section of the interview concentrated on the patient's perceptions of the surgical episode in terms of satisfactions, dissatisfactions, and the resolution of the problem for which the patient was treated. The last section of the interview obtained general information on the patient's background and general health. The patient interview instrument is presented in the Appendix of this report.

In-Depth Dicussions With Selected Physicians. Because it was not possible to obtain permission to conduct the resource utilization study in physicians offices, information on the treatment characteristics for selected procedures performed in the physician office setting could only be obtained through in-depth discussions. The absence of direct observation and the reliance on physician self-report for this part of the process quality analysis makes the physician's office setting evaluation considerably less rigorous than the analysis of the institutionally based settings. Discussions were held with fifteen physicians with respect to six procedures. Eight of the fifteen physicians allowed selected medical records of patients treated in the office setting to be abstracted. However, the general lack of detail and comprehensiveness of the physicians' office medical records made an analysis of the medical record data essentially useless from a substantive standpoint for comparison with treatment characteristics obtained from the institutional surgical settings.

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[4] Ibid.

In the analysis of the quality of the surgical process, data were examined on both an aggregated and procedure-specific basis to determine patterns of differences across settings. Where potential systematic variations were detected by inspection, statistical tests including the Z-test and t-test were used to test for the significance of the difference between specific settings.

Outcome Quality

The assessment of surgical outcome was based on information obtained from the medical records to examine the frequency of complications and unscheduled transfers resulting from surgery in the alternative surgical settings. Also obtained from the medical records study was information on the performance of pathology examinations for selected surgical procedures and the findings of the pathology review.

The patient's report of the resolution of the problem requiring surgery and the patient's satisfactions and dissatisfactions with the surgical episode were obtained through the use of the patient questionnaire. In addition, the number of bed days and disability days after surgery were examined by procedure and surgical setting.

The physician's satisfaction with alternative surgical settings was assessed by means of the physician questionnaire. The physicians were requested to rate the surgical settings with which they had experience in terms of overall satisfaction and convenience. In addition, the physicians were asked to describe in detail any perceived advantages or disadvantages of the ambulatory surgical setting and the inpatient surgical setting for the performance of minor surgical procedures. Additional detail on the methodology used in the outcome quality study is presented in the Appendix.

Data on the outcome quality were analyzed using a descriptive analysis that compared the measures of outcome quality across surgical settings. The analysis was essentially similar to that performed on the process data.

FINDINGS: STRUCTURAL QUALITY

Structural quality is the most frequently assessed characteristic of health care institutions. The majority of the licensure and regulatory requirements of federal and state programs as well as the accreditation standards of voluntary organizations emphasize the structural aspects of institutional health care delivery. Historically, this has been the case because the so called "structural" elements were the most readily identifiable, in some cases measurable, and to some extent drew upon the knowledge and experience of state and local governments with building and architectural codes. However, as the methodology to assess the quality of health care services and facilities grew more sophisticated, the narrow structural component of quality assessment also expanded to include the major categories of resources (personnel, equipment, and facilities) and the organization of resources within the institution.

Operational Definition of Structural Quality

The definition of structural quality used in this study included the following six major components:

- Compliance with state and local laws

- Organizational and administrative characteristics of surgical settings including the availability, competence, and qualifications of resources
- Organizational arrangements for utilization review and quality assurance
- Physical characteristics of facilities
- Patient care policies of institutions
- Patient care policies as reported by a sample of Maricopa County physicians.

The assessment of the structural quality of alternative surgical settings employed these six aspects of structural quality as specifically related to minor surgical services. It should be noted that the literature also refers to the minimum volume of specialized services as an aspect of the structural quality of a facility. However, the types of services generally referred to are, for example, cardiac catheterization, open heart surgery, and neonatal intensive care. Minor, elective surgery is generally not considered as a specialized service and, therefore, this aspect of structural quality was excluded from the evaluation.

In the analytical issues discussion that preceded this section, the uncertain link between the structure, process and outcome aspects of quality was discussed. The inferences from the structural quality evaluation with respect to the overall issue of the quality of care provided within a facility must be considered incomplete until definitive causal relationships between structure, process and outcome aspects of quality can be established. Therefore, the analysis of structural quality reported in this section is primarily descriptive. Where differences were found they are highlighted and potential implications are discussed. However, it was not possible to make a summative assessment across all the dimensions of structural quality to produce a single measure or index of the structural quality of a surgical setting.

Compliance With State and Local Laws

All seven facilities included in the evaluation were determined to be in substantial compliance with state and local laws. Three types of compliance were assessed:

- Licensure of facility
- Licensure or registration of personnel
- Conformity with laws relating to fire and safety.

With respect to the FSASC setting, the facility licensure and the licensure and registration of personnel were somewhat ambiguous because of the lack of a specific licensure law and implementation regulations for FSASCs in Arizona. As of April, 1976, the FSASC was operating under a "letter in lieu of licensure" from the State. According to the licensure section of the Department of Health, the state was in the process of developing specific standards for FSASC facility personnel.

The FSASC was also noted to have received a certificate of accreditation from the Society for the Advancement of Free Standing Ambulatory Surgery, which has developed accreditation standards for such facilities based on Medicare, American Hospital Association and other accreditation and review procedures.

In terms of conformity with laws relating to fire and safety, the FSASC administrator stated that inspection was made at six month intervals by the City Fire Marshall, and inspection of the most recently available report noted general compliance with requirements with only minor exceptions.

The two HAASCs were also in substantial compliance with the licensure and other laws. The licensure requirements were the same for the hospital based ambulatory facility as for the inpatient hospital facility. One facility stated that it expected the ambulatory unit to be licensed as a separate facility in that it is located off the hospital campus in a medical office building across the street. The licensure from the State Department of Health Services would then be renewed on an annual basis. The second HAASC facility is located on the hospital campus although it is in a building that is leased out by the hospital for physicians' offices. According to the administration, the hospital holds a single license issued by the Department of Health Services. Both of the hospitals with HAASCs are accredited by the Joint Commission on the Accreditation of Hospitals (JCAH).

Fire and safety inspections found no deficiencies; however the frequency of inspection was weekly for the HAASC located on the hospital campus and annually for the HAASC located off-campus in a medical office building.[5]

The OP surgical settings in the four facilities included in the study were, for the purposes of licensure of the facility and licensure and registration of personnel, considered to be part of the inpatient hospital. Therefore, the following comments apply to both OP and IP surgical settings.

All four OP facilities had current licensure of facility and personnel, and were accreditated by the JCAH. Two of the four facilities reported scheduled inspections by the Occupational Safety and Health Administration (OSHA); the HAASCs and FSASC did not report any involvement with OSHA as of April, 1976. All four facilities were in conformance with fire and safety laws with no deficiencies noted on the most recent reports.

All seven facilities included in the study reported that it was a policy that the nursing staffs be licensed or registered in accordance with applicable state laws.

Summary of Findings. With respect to compliance with state and local laws it was found that:

- No substantial differences were observed among surgical settings in the extent of compliance with Arizona state law and local codes.

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[5] The HAASC with weekly inspections reported that the local Fire Marshall was in the main hospital building for training purposes on a weekly basis, and also inspected the HAASC at the same time.

- The legal status of the FSASC as of April, 1976, was somewhat imprecise because of the absence of a specific licensure law to which the facility is subject and the lack of adopted regulations. The FSASC at that time had a "letter in lieu of licensure" from the Department of Health Services which permitted it to conduct business. Based on the legislation and regulations existing in other states, the characteristics of the FSASC and the other surgical settings in the study, and the authorizing letter from the state , it is likely that the FSASC would be granted a license if the legislation existed.[6]

Differences in the Organization and Administrative Structure of Surgical Settings

Whereas little or no difference was found with respect to the legal compliance aspects of structural quality, there were substantial differences evident between surgical settings for most aspects of organizational and administrative structure. Before the detailed comparisons are presented, the underlying reasons behind the differences in organizational and administrative structure are discussed.

Based on discussions with facility administrators, two factors were apparently the most influential in differentiating the FSASC from other surgical settings. The first was the size of facility and the scale of operation. It must be remembered that in comparison to the inpatient hospitals, the FSASC is a very small operation with administratively more the characteristics of a small service organization than a large health services institution. This reduced scale of operation meant that the administration of the facility is closer, physically and organizationally, to the direct delivery of service than is the administration of an inpatient institution. The HAASCs, in terms of administrative organization, were also very different from the FSASC. Both HAASCs, while physically separate from their respective hospitals, were the administrative responsibility of an assistant or associate administrator in the hospital. Typically, this assistant or associate administrator had other inpatient hospital responsibilities as well. The day-to-day supervision of the HAASCs, as described later in this report, is carried out by an experienced Registered Nurse who also provides direct patient care. Therefore, in one sense, the top level administrator of the HAASCs is more isolated from the function of the facility than is the administrator of the FSASC. In another sense, the supervisory responsibility for the daily operation of the HAASCs has been delegated to a greater extent than in the FSASC.

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[6] The Orkand Corporation, The Influence of Federal and State Regulations, Policies of Third Party Payors, and Positions Adopted by National Organizations on Freestanding Ambulatory Surgical Centers, November 24, 1976. Submitted to the Social Security Administration under Contract No. SSA-PMB-74-387.

The second major factor that caused the FSASC setting to be unique was the primary objective of service. The primary objective of the hospital, even those facilities with HAASCs, is not to provide outpatient surgical services. Rather, it is to provide comprehensive medical care - particularly for those patients requiring hospitalization. On the other hand, the FSASC has surgery as its single speciality, focussed only on those procedures and patients appropriate to an ambulatory setting. This narrower focus allowed the FSASC to be less concerned with what are major concerns for the hospital facility -- including a broader patient and case mix, heavy capital investment in highly specialized equipment, multiple departmental demands, and, most significantly, a substantial administrative bureaucracy.

The specific organizational aspects of the facilities included in the study that directly or indirectly affect the delivery of service are discussed in the following sections.

Organization and Responsibilites of the Governing Body. The governing bodies of the surgical facilities included in the study differed substantially in both organization and function. In the inpatient institutions, the governing body was similar to the board of directors of a medium to large size corporation. For the hospital-based surgical settings (including the HAASCs) the governing body consisted of the board of directors of the institution, some of whom are not directly involved in the delivery of health care services. There was no separate governing body for the HAASCs because they are considered, organizationally, an integral part of the hospital facility.

In contrast, as of April 1976, the governing body of the FSASC consisted of the two owners/founders/directors - Dr. Wallace Reed and Dr. John Ford, both anesthesiologists.[7] At the FSASC, the members of the governing body were, thus, directly involved in daily provision of patient care in contrast to most members of the governing body of the hospital facilities.

Several aspects of the organization and responsibilities of the governing body were considered in the evaluation. The major elements including similarities and differences are discussed in the following sections:

Bylaws - The FSASC and all of the private, voluntary hospitals included in the study had bylaws that had been formally adopted by the governing bodies. The bylaws were in writing and were available to all members of the governing bodies. Although the specific sets of bylaws differed in level of detail and scope of coverage, they generally specified to whom the responsibilities for the operation and maintenance of the facility were delegated. For each facility the overall responsibility was given to the chief executive officer who was the facility administrator in the case of the hospitals and to the directors in the case of the FSASC. The Children's Hospital, however, as a state-run institution did not have any formal bylaws. The institution operates under Arizona House Bill 2056. This institution's governing body formally consisted of the administrator, the medical director and a representative of the Department of Health Services.

Meetings - All of the hospital facilities hold meetings of the governing bodies at least monthly except in the case of the Childrens Hospital where the board functions had been delegated to the Director of Health Services of the State. The governing body of the FSASC operates somewhat differently, however. A formal meeting was held only annually. However, the two anesthesiologists were involved in the day-to-day management of the facility and the opinion was expressed that this involvement was a preferred substitute for a more formalized schedule of governing body meetings.

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[7] Dr. John Ford ended his affiliation with the Surgicenter during 1977.

Liaison With Medical Staff - The inpatient institutions had at least one member of the medical staff as a formal member of the governing body. Two of the institutions included the Chief of the Medical Staff as an ex-officio board member. The FSASC, however, has defined the medical staff as consisting of only the anesthesiologists who practice at the facility. Therefore, the question of representation was somewhat moot with regard to staff. In terms of other types of liaison, three hospitals in the study accomplished this by means of a specific joint conference committee composed of members of the governing body and the medical staff. The other inpatient facilities accomplished this communication function via a report to the medical staff by the president of the executive board. The FSASC did not have a formal mechanism for communication with the practicing physicians in the same sense that the hospital holds general meetings of the medical staff. In the FSASC, meetings of the practitioners who use the facility are held twice a year and individual practitioners are looked to by the owners/ directors for advice as needed. The FSASC has created two committees that assist in maintaining communcation among the practicioners on matters relevant to the FSASC. Those committees are the Medical Audit Team (MAT) and the Community Advisory Committee (CAC).

Medical Staff - The major distinction among surgical settings with respect to the medical staff was one of definition. All of the hospitals defined the medical staff as the practioners who are authorized to use the facility. The FSASC, however, formally defined the medical staff as consisting only of the anesthesiologists. Surgeons at the FSASC were granted operating privileges. As expected, all of the inpatient institutions and the HAASCs had formalized procedures for the application, consideration and appointment to the medical staff. The FSASC has no formal plan, per se. For anesthesiologists, acceptance on the staff of the FSASC was directly under the control of the owners/directors. Generally the procedure is as follows:

- A letter is received from a practicing anesthesiologist requesing permission to join
- An application form is filled out
- References are checked
- Acceptance on a trial basis or rejection is determined
- Full acceptance is granted.

For a surgeon requesting practicing privileges, the process was somewhat different. The surgeon applies to the FSASC for acceptance. The criterion applied to determine whether or not the physician will be granted privileges is the membership of the physician on the staff of local hospitals and authorization by local hospitals to do the surgical procedure. Effectively, the FSASC used the hospitals to initially screen the qualifications of the physician - although the owners/directors maintained final control of who practices in the facility and may not accept a physician even if qualified to practice at one or more inpatient facilities.

The HAASC policies with regard to medical staff are identical to their parent inpatient institutions. For the hospitals with HAASC or OP settings, it is significant to note that in only one hospital (with an HAASC) was there a medical staff committee for ambulatory surgical services. Generally, the hospitals consider the HAASCs or outpatient surgery activity as an integral part of the inpatient organization from the standpoint of the governing body and the medical staff organization. However, several hospital representatives admitted they were reconsidering the organizational status of the ambulatory surgery department within their institutions.

Qualified Facility Administrator - Again the FSASC was observed to be different from the inpatient hospital facilities. Because of the more specific focus of services, the smaller scale of operation and organization, and the on-site presence of the facility owners/directors, the role of the facility administrator in the FSASC was considerably reduced in scope from the administration's role than that in a hospital setting. The administrator of the FSASC functions in the role of the facility office manager. He holds a BA degree in personnel management and economics and has worked in both acute care hospitals and Extended Care Facilities. Although the manager had not had formal education training in a accredited hospital administration program, the owners/directors of the FSASC stated that his background and training were adequate to perform in his responsibilities at the facility. It is important to note that the facility administrator role was seen as support to the medical and nursing staffs. He had no formal liaison responsibilities with the physicians -- this responsibility was primarily reserved for the owners/directors. The nursing staff was also under the direction of the owners/directors with the administrator dealing with personnel issues and problems. The administrator was responsible for directing and supervising all non-patient care staff and for conducting the business aspects of the facility. The administrator was a full-time employee and worked in conjunction with a full-time accountant who was responsible for taxes and financial planning. The responsiblities of the administator in the FSASC differed sharply from the responsibilities of the hospital administator who monitors the activity of the department by means of utilization and financial reports.

Organization of Medical Staff and Relationships with the Administration. As previously mentioned, the medical staff of the FSASC consisted of the practicing anesthesiologists. It is essentially among this group that policies and decisions affecting the operation of the facility are made. The anesthesiologists meet on a monthly basis to discuss and resolve facility-related issues. According to an owner/director of the FSASC, this limitation on the medical staff is a time-saving device because surgeons do not have to attend large staff meetings which the owner/director considered as excess, non-essential busy work. The anesthesiologist meetings, according to the owner/director "satisfy bureaucrats". Unlike the hospital settings, the FSASC has no elaborate committee structure for the medical staff. Rather, the anesthesiologist medical staff, as a single group, deals with issues as they arise. The staff dealt primarily with the issues of selection of anesthesia techniques, patient care process in the facility, and equipment considerations. On the other hand, the hospital's medical staff was generally composed of numerous committees with specific functions including bylaws, credentials, tissue, medical records, utilization review, monitoring, etc. The tissue review and utilization review functions in the FSASC were handled by the Medical Audit Team described in the utilization review section of the structural quality assessment.

For all inpatient institutions, there were prescribed disciplinary procedures for infraction of facility and medical policies which were adopted by the medical staff. In the FSASC the owner/directors personally deal with all situations where corrective action may be necessary.

In the inpatient institutions included in the study, consultations were generally not required for minor surgical procedures except for specific types of cases. Consultation was apparently used when the patient was considered a high risk for the procedure because of a pre-existing condition or other factor. When termination of pregnancy was proposed by means of a therapeutic dilation and curettage (not performed at the FSASC) consultation was generally required. At the FSASC, consultation was not required for specific procedures; however the anesthesiologist staff or the surgeons may initiate discussions on an ad hoc basis when considered necessary. The determination of the need for the procedure from the facility's perspective was solely the responsibility of the surgeon.

All institutions including the FSASC permit some general practitioners and family practicioners to admit patients. However, one inpatient institution does not grant surgical privileges to these two groups. The FSASC has a small proportion of G.P.s and F.P.s on the active staff -- 4 to 5% -- and discourages them from performing certain type of procedures.

Organization of the Nursing Staff. In the FSASC setting the nursing staff was directly responsible to the anesthesiologist owners/directors. In all other surgical settings the nursing staff in the surgery area reported to nursing administration and was, therefore, several steps removed fom the medical/surgical staff. In both of the HAASCs, the day-to-day overall supervision of the facility was the responsibility of a senior, experienced RN. In both HAASCs and the FSASC, one RN was assigned as the lead person for the operating area and another for the preoperative and postoperative areas. Personnel assignments between spaces remained relatively fixed, however, occasional substitutions were necessary. In the outpatient and inpatient surgical settings, the specialization of function was more evident with different teams for preoperative, operative, and postoperative care.

The types of nursing staff also differed The FSASC is staffed with all RNs whereas one of the HAASCs employed surgical operating room technicians to assist in the operating room. Both the FSASC and HAASC settings use nurse's aides and/or orderlies for assistance in admitting and transporting patients.

The hospital outpatient and inpatient surgical settings also made use of the RN and operating room technician combination; however, Licensed Practical Nurses are also used in the preoperative and postoperative phases in four of the six IP/OP surgical settings included in the study.

In two of the inpatient facilities, and on occasion in one of the HAASC settings included in the study, a certified registered nurse anesthetist was used to maintain anesthesia after it was induced by an anesthesiologist. This was not standard practice at either the FSASC or the other HAASC, where the presence of an anesthesiologist is required at all times in the operating room when a patient was under general anesthetic.

Organization of the Medical Records Department. The organization of the medical records department differed substantially among surgical settings. In the hospital settings, the medical record department was responsible for the transcription and maintenance of all inpatient and outpatient records. The six hospital-based facilities differed somewhat in some specific policy and practice areas - mostly with respect to filing procedures and storage of archived records. However, there was agreement in most areas, including content, access, promptness of record completion and signature requirement. The HAASC records were also maintained by the hospital medical records department. In all facilities separate files were used for inpatient and outpatient cases.

The two distinctions of note with regard to medical records were in the format of the record itself and qualifications of the medical records department personnel. The first applied to the OP, HAASC and the FSASC settings; and the second applied only to the FSASC.

Medical records for ambulatory patients are very abbreviated versions of inpatient medical records. The inpatient record requires several pages versus one extended form for the HAASCs and FSASC. The format of the outpatient record is the least specific of the three outpatient settings. The HAASC and FSASC medical records are quite similar in that the FSASC format was used as the model for both HAASC facilities. Examples of medical records used in the FSASC setting and in one of the HAASC settings are presented in Exhibits IV-1 and IV-2.

The most apparent limitations in the HAASC and FSASC medical record format were in the space reserved for description of the chief complaint, indications for surgery, and in the results of the history and physical. Because neither setting used radiological services or consultations as a routine practice, there was also no area set aside on the record for these reports.

The second major difference between the FSASC and other settings is in the qualifications and training of the person responsible for the medical records function. In all of the hospitals included in the study, the medical record department was supervised by a registered medical record librarian. At the FSASC, the person responsible for the preparation, typing and maintenance was a medical clerk without specialized training in medical records maintenance.

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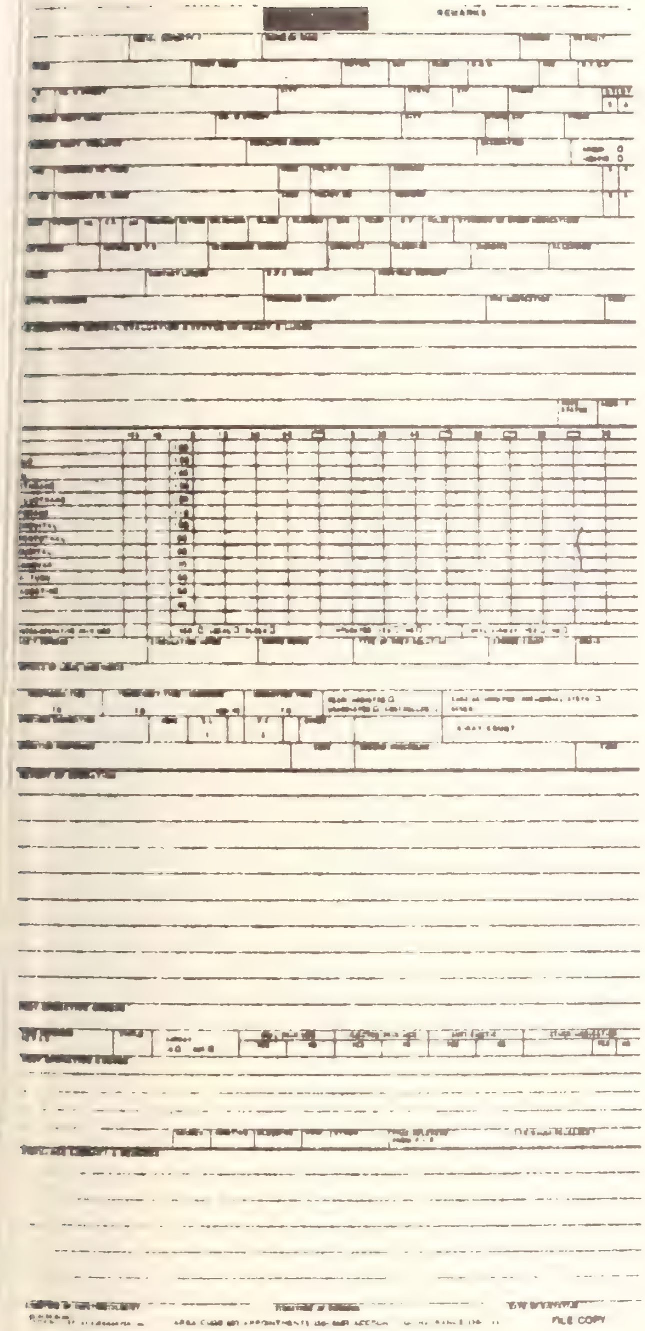
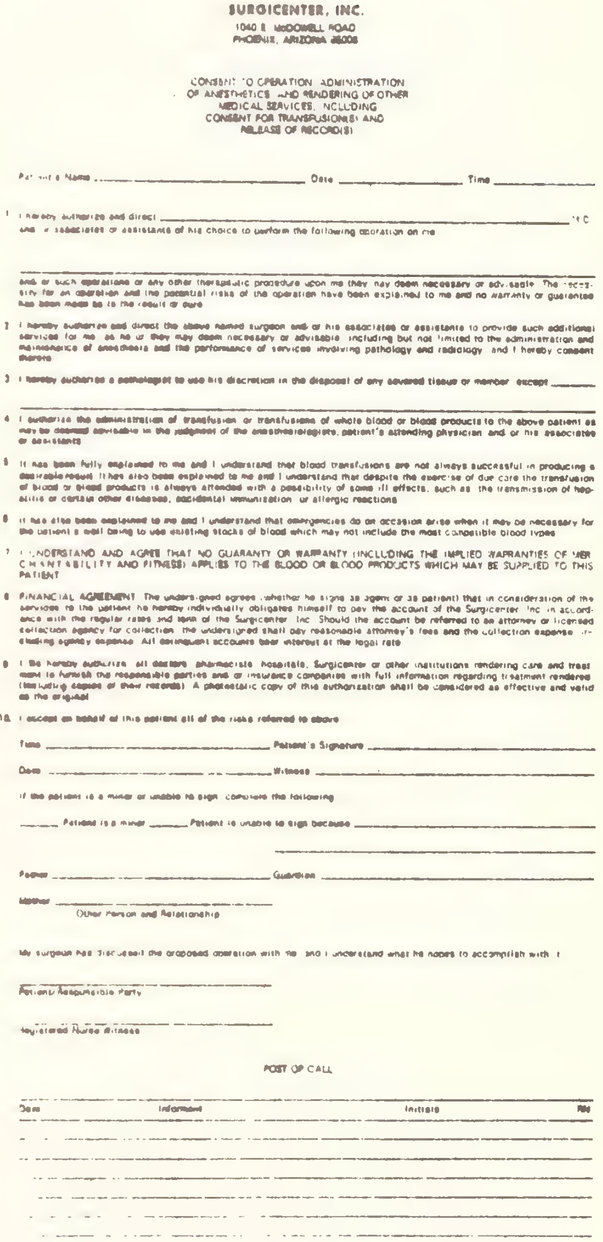
Exhibit IV-1

Sample FSASC Patient Medical Record


REMARKS
FILE COPY



SURGICENTER, INC.
1040 E. McDOWELL ROAD
PHOENIX, ARIZONA 85006

CONSENT TO OPERATION, ADMINISTRATION OF ANESTHETICS, AND RENDERING OF OTHER MEDICAL SERVICES, INCLUDING CONSENT FOR TRANSFUSION(S) AND RELEASE OF RECORD(S)

Patient's Name ______________________ Date ____________ Time ____________

1. I hereby authorize and direct ______________________ M.D. and/or associates or assistants of his choice to perform the following operation on me ______________________ and/or such operations or any other therapeutic procedure upon me they may deem necessary or advisable. The necessity for an operation and the potential risks of the operation have been explained to me and no warranty or guarantee has been made as to the result or cure.

2. I hereby authorize and direct the above named surgeon and/or his associates or assistants to provide such additional services for me as he or they may deem necessary or advisable, including but not limited to the administration and maintenance of anesthesia and the performance of services involving pathology and radiology, and I hereby consent thereto.

3. I hereby authorize a pathologist to use his discretion in the disposal of any severed tissue or member, except ______________________

4. I authorize the administration of transfusion or transfusions of whole blood or blood products to the above patient as may be deemed advisable in the judgment of the anesthesiologists, patient's attending physician, and/or his associates or assistants.

5. It has been fully explained to me and I understand that blood transfusions are not always successful in producing a desirable result. It has also been explained to me and I understand that despite the exercise of due care the transfusion of blood or blood products is always attended with a possibility of some ill effects, such as the transmission of hepatitis or certain other diseases, accidental immunization, or allergic reactions.

6. It has also been explained to me and I understand that emergencies do on occasion arise when it may be necessary for the patient's well being to use existing stocks of blood which may not include the most compatible blood types.

7. I UNDERSTAND AND AGREE THAT NO GUARANTY OR WARRANTY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS) APPLIES TO THE BLOOD OR BLOOD PRODUCTS WHICH MAY BE SUPPLIED TO THIS PATIENT.

8. FINANCIAL AGREEMENT: The undersigned agrees (whether he signs as agent or as patient) that in consideration of the services to the patient he hereby individually obligates himself to pay the account of the Surgicenter, Inc. in accordance with the regular rates and term of the Surgicenter, Inc. Should the account be referred to an attorney or licensed collection agency for collection, the undersigned shall pay reasonable attorney's fees and the collection expense, including agency expense. All delinquent accounts bear interest at the legal rate.

9. I (We) hereby authorize all doctors, pharmacists, hospitals, Surgicenter or other institutions rendering care and treatment to furnish the responsible parties and/or insurance companies with full information regarding treatment rendered (including copies of their records). A photostatic copy of this authorization shall be considered as effective and valid as the original.

10. I accept on behalf of this patient all of the risks referred to above.

Time ______________________ Patient's Signature ______________________

Date ______________________ Witness ______________________

If the patient is a minor or unable to sign, complete the following:

_______ Patient is a minor _______ Patient is unable to sign because ______________________

Father ______________________ Guardian ______________________

Mother ______________________
Other Person and Relationship

My surgeon has discussed the proposed operation with me, and I understand what he hopes to accomplish with it.

____
Patient/Responsible Party

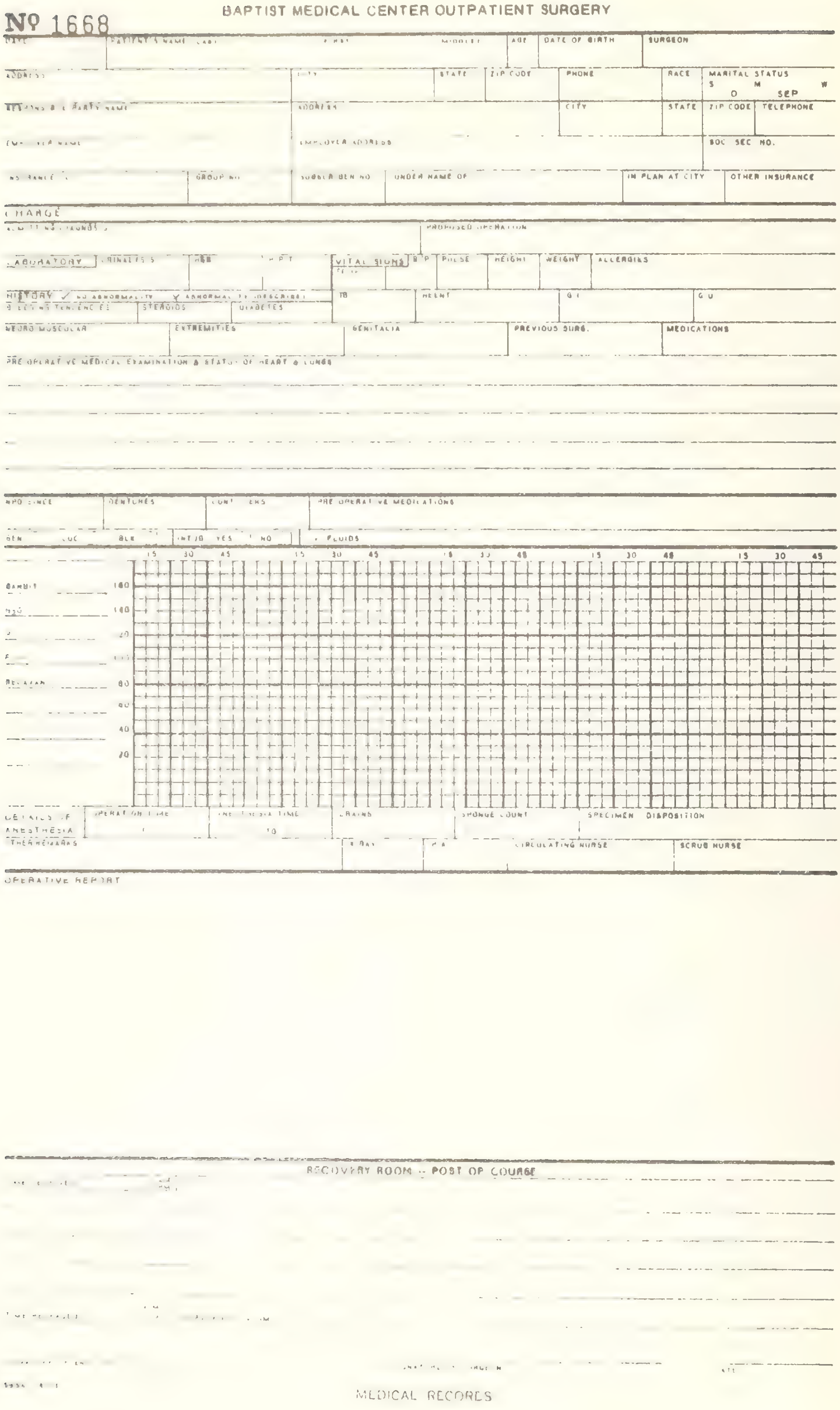
____
Registered Nurse Witness

POST OP CALL

Date	Informant	Initials	RN

Exhibit IV-2

Sample HAASC Patient Medical Record



Nº 1668

BAPTIST MEDICAL CENTER OUTPATIENT SURGERY

DATE | PATIENT'S NAME LAST | FIRST | MIDDLE | AGE | DATE OF BIRTH | SURGEON

ADDRESS | CITY | STATE | ZIP CODE | PHONE | RACE | MARITAL STATUS S M W D SEP

RESPONSIBLE PARTY NAME | ADDRESS | CITY | STATE | ZIP CODE | TELEPHONE

EMPLOYER NAME | EMPLOYER ADDRESS | SOC SEC NO.

INSURANCE | GROUP NO | SUBSCR BEN NO | UNDER NAME OF | IN PLAN AT CITY | OTHER INSURANCE

CHARGE

ADMITTING DIAGNOSIS | PROPOSED OPERATION

LABORATORY | URINALYSIS | HGB | HCT | VITAL SIGNS TEMP | B P | PULSE | HEIGHT | WEIGHT | ALLERGIES

HISTORY ✓ NO ABNORMALITY X ABNORMALITY (DESCRIBE) | TB | HEART | G I | G U

BLEEDING TENDENCIES | STEROIDS | DIABETES

NEURO MUSCULAR | EXTREMITIES | GENITALIA | PREVIOUS SURG. | MEDICATIONS

PRE OPERATIVE MEDICAL EXAMINATION & STATUS OF HEART & LUNGS

NPO SINCE | DENTURES | CONT [illegible] | PRE OPERATIVE MEDICATIONS

GEN | LOC | BLK | INTUB YES NO | IV FLUIDS

15 30 45 15 30 45 15 30 45 15 30 45 15 30 45

160
140
120
100
80
60
40
20

RELAXANT

DETAILS OF ANESTHESIA | OPERATION TIME | ANESTHESIA TIME TO | DRAINS | SPONGE COUNT | SPECIMEN DISPOSITION

OTHER REMARKS | X RAY | P A | CIRCULATING NURSE | SCRUB NURSE

OPERATIVE REPORT

RECOVERY ROOM -- POST OP COURSE

MEDICAL RECORDS

The important question is whether or not these two differences in the medical records activity are significant. Both differences would seem to affect the amount and detail of the documentation maintained with respect to a specific case. However, it could be argued that the "minor" nature of the surgical procedures performed in the outpatient, HAASC and FSASC settings does not warrant the detailed information generally recorded on the inpatient record. While this may be true with respect to the characteristics of the procedure and the description of the technique employed, it is not clear that this argument is applicable to the patient's preexisting conditions, medical history, or other factors that are indicative of patient risk factors. The recording of indications for surgery are also of potential significance. Typically, in the inpatient setting, the indications for surgery are detailed on the medical record -- generally to document and justify admission as required by the utilization review function within the institution. In the ambulatory setting, the indications were very limited on the extent of description provided. One or two key words were the average amount of information relative to indications. While it could be argued that several of the obviously elective surgeries including many plastic procedures (augmentation mammoplasty, blepharoplasty, wart and mole removals) and sterilization surgeries (laparoscopy with bilateral tubal coagulation and vasectomy) require little or no documentation of indications, the same cannot be said of the majority of minor surgeries. For example, for a breast mass excision, the indications must be documented not only for the procedure itself, but for the appropriateness of the surgical setting. The higher the risk of malignancy, according to the results of the physician interview presented later, the more likely it is that the patient should be admitted to the inpatient setting because of the high probability of complex follow-up surgery.

One additional difference in medical records across surgical settings from a structural quality aspect was noted. The inpatient medical record and report of the surgery generally became part of a permanent medical file for the patient at the institution. Any other admission for that patient and the medical information concerning treatment was recorded in that permanent file. The outpatient, HAASC, and FSASC had no such patient-specific permanent file. Thus in the ambulatory settings the medical information across treatment episodes was not linked. For example, if a patient is operated on at the FSASC in January for a dilation and curettage, a medical record number is assigned for that procedure by the facility. If the same patient enters the facility again for another dilation and curettage in February another medical record number is assigned, and, from the facility standpoint, no reference to the previous procedure is required. The medical records in the ambulatory settings were essentially encounter forms rather than a permanent, collated file of medical data.

Both the HAASCs and the FSASC send the responsible surgeon a copy of the medical record for inclusion in the patient's file at the surgeon's office. Thus, it would appear that the focus of responsibility for the compilation and maintenance of a patient's medical file moves from the institution to the individual practitioner when an operation is performed on an ambulatory basis.

Organization of Laboratory, Radiology, and Pathology Services. The approach to the provision of the laboratory, radiology, and pathology support services also differed among surgical settings. Exhibits IV-3, IV-4, and IV-5, profile the facilities and settings on selected characteristics of the laboratory, radiology, and pathology services provided by the facility and its appropriate departments.

Each of the inpatient facilities maintained a complete laboratory department which provided services for inpatient and ambulatory surgical patients. One HAASC used the services of the hospital's outpatient laboratory, located in the same building as the surgical center, for all routine work. The other HAASC used the hospital's main laboratory for all lab work done on ambulatory surgical patients. The FSASC provided a minimum of laboratory capability on the premises and, for other than the most simple testing, specimens were sent out to independent laboratories for testing. All laboratory work performed at the FSASC was done by an RN. In all other surgical settings the tests were performed by ASCP medical technologists. It should be emphasized that for the minor surgical procedures included in the study, it was infrequent that any exotic test was performed on the patients in the ambulatory settings. In the inpatient setting, however, some patients, because of other complicating conditions, had several laboratory tests performed that were relatively uncommon or required special equipment not available in the FSASC setting.

Exhibit IV-3

Selected Structural Characteristics of Clinical Laboratory Departments by Surgical Setting and Facility

Characteristic	Surgical Setting and Facility												
	Inpatient						Outpatient				HAASC		FSASC
	#1	#2	#3	#4	#5	#6	#1	#2	#3	#4	#1	#2	
1.0 Laboratory Services 1.1 Does the facility have the capability to perform the following types of clinical tests or must they be performed under outside arrangement?													
Chemistry	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	outside
Microbiology	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	outside
Hematology	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	outside
Serology	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	outside
Urinalysis	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
1.2 When services are provided by an outside laboratory, are the conditions, procedures, and availability of work done in writing and available in the facility?	yes	yes	yes	N/A	N/A	N/A	yes	N/A	N/A	N/A	yes	yes	no
2.0 Personnel 2.1 Do ASCP medical techologists, other medical technologists, registered nurses, or other personnel perform the required laboratory tests?	ASCP Medical Techs.	ASCP Medical Techs. Other Med. Techs.	ASCP Med. Techs. Other Med. Techs.	ASCP Med. Techs. Other Med. Techs.	ASCP Med. Techs.	ASCP Med. Techs.	ASCP Med. Techs.	ASCP Med. Techs. Other Med. Techs.	ASCP Med. Techs.	ASCP Med. Techs.	N/A	ASCP Med. Techs. Other Med. Techs.	R.N.

Source: Facility Survey Reports

Exhibit IV-3 — Cont.

Characteristic	Surgical Setting and Facility												
	Inpatient						Outpatient				HAASC		FSASC
	#1	#2	#3	#4	#5	#6	#1	#2	#3	#4	#1	#2	
3.0 Policy 3.1 What clinical laboratory tests are required for minor surgery patients admitted to the facility?													
Hemoglobin	yes	yes	yes	yes	yes	yes		yes	yes	yes	yes	yes	no
Hematocrit	yes	yes	yes	yes	yes	yes		yes	yes	yes	yes	yes	yes
Complete Blood Cell Count	yes			yes	only fo gen'l anes.			yes	nly fo gen'l anes.		yes	yes	no
White Blood Cell Count	yes	yes	yes	yes	yes	yes		yes		yes	yes	no	no
Differential	yes	yes	yes	yes	yes			yes	yes		yes	no	no
Blood Chemistry	yes	no		yes				yes			no	no	no
RPR or VDRL				yes				yes			yes	no	no
Urinalysis - Dipstick	yes	yes	yes	yes	yes	yes		yes	yes	yes	yes	yes	yes
Urinalysis - Microscopic	yes	yes	yes	yes	yes	yes		yes	yes	yes	no	no	no
3.2 Is the laboratory work performed before or after the patient is admitted to the facility?	after	afte	after	after	after	after	both	both	after	after	after	before	after
3.3 Are signed laboratory reports filed with the patient's medical record?	yes	yes	yes	yes	yes	yes	yes	yes	yes	not uni-formly	yes	yes	no

*Values are recorded directly on the medical record, without the preparation of a formal, or signed, laboratory report.

Exhibit IV-4

Selected Structural Characteristics of Radiology Departments by Surgical Setting and Facility

Characteristic	Surgical Setting and Facility												
	Inpatient						Outpatient				HAASC		FSASC
	#1	#2	#3	#4	#5	#6	#1	#2	#3	#4	#1	#2	
1.0 Radiological Services													
1.1 Does the facility have available diagnostic radiological services?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
2.0 Personnel													
2.1 Are the radiological services provided by the facility under the supervision of a qualified radiologist?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
2.2 Is the Radiologist who is responsible for the interpretation of films that require specialized knowledge present on a full-time, part-time, or consulting basis, with the facility?	Full-time	Full-time	Full-time	Part-time	Full-time	Full-time	Full-time	Part-time	Full-time	Full-time	Full-time	Full-time	Consulting
2.3 Is the use of all X-Ray apparatus limited to personnel designated as qualified by either the Radiologist or a committee of the medical staff?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
3.0 Policy													
3.1 Is a chest X-Ray required of surgical patients?	yes	Patients older than 60 or younger than 5	yes	yes	yes	yes	yes	no	yes	yes	no	no	no

Source: Facility Survey Reports

Note: Additional information on the proportion of Maricopa County physicians who consider that a chest X-ray should be required for each specific procedure is presented in Exhibit IV-12.

Exhibit IV-5

Selected Structural Characteristics of Pathology Departments by Surgical Setting and Facility

Characteristic	Surgical Setting and Facility												
	Inpatient						Outpatient				HAASC		FSASC
	#1	#2	#3	#4	#5	#6	#1	#2	#3	#4	#1	#2	
1.0 Pathology Services 1.1 Does the facility have available pathology services as required either within the surgical facility or by outside arrangement?	within facility	within facility	within facility	within facility	within facility	within facility	within facility	within facility	within facility	within facility	within facility	within facility	outside facility
2.0 Personnel 2.1 Is the Pathologist who is responsible for examining tissues removed from patients present on a full-time, part-time, or consulting arrangement with the facility?	Full-time	Full-time	Full-time	Part-time	Full-time	Full-time	Full-time	Full-time	Full-time	Part-time	Full-time	Full-time	Consulting
3.0 Policy 3.1 Is it required that all tissues removed from patients at surgery be examined by a Pathologist?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no
3.2 Are signed reports of tissue examinations filed with the patient's medical record?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Source: Facility Survey Reports

The set of laboratory tests required as routine varied from setting to setting. The FSASC performed the fewest tests with only a dipstick urinalysis and a hematocrit taken for all patients. In addition to these two tests, both HAASCs performed a complete blood count (CBC) and one HAASC performs Rapid Plasma Reagent tests on all patients as a screening for veneral disease. The inpatient surgical settings had a more comprehensive set of routine laboratory tests than either the HAASC or FSASC settings. Typically both hemoglobin and hematocrit are done as part of a complete blood count and a microscopic urinalysis is performed. It should be noted that what is included in a CBC differs somewhat from facility to facility. In some facilities a differential is generally included; in others it must be specified separately. In all surgical settings, the set of tests routinely performed varied for particular procedures. This is typically the case for tonsillectomy and adenoidectomy where a prothrombin or partial prothrombin was performed in most facilities as a check on blood coagulation time. In all settings, signed laboratory reports were filed with, or the values recorded in, the patient's medical record.

All of the inpatient facilities provided pathologist services as part of the hospital organization. The FSASC, however, obtained pathologist services from any one of the three major hospitals located in the immediate vicinity or from an independent laboratory. The use of a particular pathologist service by the FSASC is at the preference of the physician.

Unlike the hospital-based surgical settings the FSASC does not maintain blood storage facilities. Rather, blood, if needed, was provided by special arrangement with Good Samaritan Hospital, located across the street. It was estimated that it would take about fifteen minutes to obtain blood. In eight years of surgery at the FSASC involving more than 47,000 patients, blood has been requested fifteen times. However, a tranfusion has never been performed.

Radiological Services were available within each surgical facility, however, as with laboratory services the organization of these services across settings differed substantially. In the inpatient settings the radiology departments were staffed by certified technicians and by either a full or part-time radiologist. The FSASC also had a certified X-ray technician as part of the nursing staff but, of course, no formal departmental structure. As described later, the equipment available in the FSASC and the HAASC facilities was relatively limited. The x-ray equipment is of the portable type used to assist in orthopedic procedures but also capable of taking chest films if required. In none of the ambulatory surgical settings, outpatient, HAASC and FSASC, were chest x-rays required as standard policy for patient admission unless requested by the physician. For inpatients either a one- or two-view X-ray were generally required for surgical patients depending on the type of procedure.

Summary of Findings. With respect to the organizational and administrative aspects of structural quality one major finding emerged from the assessment.

- In the FSASC surgical setting to a considerably greater degree than in the hospital based alternative settings, the owners/directors were in direct, day-to-day control of the functions of the facility, particularly those functions related to direct patient care. This difference between the FSASC setting and the other surgical settings was primarily the result of two factors: The reduced size, scale, and complexity of the FSASC in comparison to the hospital institution; and the limited breadth and focus of the organizational mission of the FSASC.

Other principal findings are summarized below:

Governing Bodies -

- For hospital-based settings the institutional board of directors was larger in comparison to the FSASC setting and included individuals not directly involved in health care delivery. In contrast, the FSASC governing body, consisted of the two owners/directors of the facility who practice anesthesiology in the facility on a regular basis.

- There were major differences in the extent of the delegation of authority between surgical settings. In the hospital-based settings there was substantially more delegation of authority within both administrative and nursing functions. In the FSASC, the owners/directors maintained more direct control of the operation of the facility.

Medical Staff -

- In the FSASC setting the medical staff was defined as the anesthesiologists who practice in the facility; whereas, the hospital-based settings considered all physicians with privileges as members of the medical staff. Therefore, at the FSASC, responsibility for patient care policies was focused on the anesthesiologists who provided the continuing monitoring of patients in the facility.

- Relationship between the physicians (non-anesthesiologists) and the facility was less formalized in the FSASC setting than in the other hospital-based surgical settings. Control of physician privileges was thus maintained by the owners/directors.

- Overly complex aspects of medical staff organization were to a great extent eliminated in the FSASC setting with the result that physician time was saved and paperwork reduced. It should be noted that physicians with privileges at the FSASC setting also were required to be on the staff of the one or more hospitals in the county and may therefore, already have had committee assignments or commitments on other hospitals' staffs.

Nursing Staff -

- In the FSASC setting, the nursing staff was directly responsible to the owners/directors. In all other surgical settings included in the study, the nursing staff in the operating and recovery room areas reported to the nursing administrator who, in turn, reported to an assistant or associate administrator. It would appear that the close liaison in the FSASC setting between nursing and owner/directors provided closer control of the nursing staff and an increased ability to respond to changes in staffing requirements.

- In the FSASC setting, registered nurses were the only category of nursing personnel employed. In several of the hospital-based settings a combination of RNs and OR technicians were used to provide care in the operating suite and a combination of RNs and LPNs were used to provide care in the preoperative holding and recovery room areas.

- In the FSASC setting, only an anesthesiologist administered anesthetics. In two of the inpatient facilities and on occasion in one of the HAASC settings, a Certified Registered Nurse Anesthetist administered the anesthetics. In all settings an anesthesiologist was either present in the operating room or on-call in the operating suite in case of difficulty.

Medical Records -

- The medical records used in the FSASC and HAASC settings are very abbreviated versions of the inpatient medical record. The OP setting medical record was typically found to be the least structured record of the four surgical settings. In contrast to the ambulatory records, the IP setting records were more complex and specific in information requirements.

- The FSASC setting had no formalized medical records department although a chronological file and backup microfilm copies were maintained. The medical records of the HAASC settings were maintained by the inpatient hospital. In some institutions the OP setting records were not filed with the inpatient medical records department but were handled separately with less quality control and less information retrieval capability.

- In the ambulatory settings, medical information for a single patient with multiple surgical episodes was not collated. In inpatient settings all information relative to one patient was included in the patient's single medical record. It should be noted that information on a single patient was generally not collated across institutions unless medical records were specifically requested by the physician or the institution.

- The personnel at the FSASC setting responsible for the maintenance of the medical records apparently had less formal training in this area than the personnel in the other hospital based settings.

Laboratory, Radiology, and Pathology Services -

- The FSASC setting, in comparison to the hospital-based settings, maintained only a very limited in-house clinical laboratory capability. Hospital-based settings used the inpatient hospital's facilities for required tests. The major difference between the set of tests required by the FSASC and other settings was in the FSASC's lack of a requirement for a complete blood count or white blood cell count for surgery patients.

- Across the ambulatory settings, chest x-rays were generally not required for minor surgery patients. All settings had at least a minimum in-house radiological capability; however the equipment maintained in the FSASC was relatively limited as compared to the equipment available in the inpatient setting.

- Pathology services were available by outside arrangement for the FSASC setting. The examination of tissue removed from patients was at the discretion of the surgeon in contrast to the hospital-based setting where pathology review is routinely performed on all removed tissue.

- The FSASC, in contrast with the hospital-based facilities, does not store blood, but can obtain it under a special arrangement from Good Samaritan Hospital across the street. (Only fifteen instances have occurred in eight years.)

Organizational Arrangements for Utilization Review

All facilities included in the study had written procedures and a formal organizational arrangement for utilization review. In the hospitals this review was conducted by the medical records, tissue review, or specifically-designated utilization review committee. The review of the medical records of ambulatory patients in the hospital was done as an adjunct to the review of inpatient records and utilization. In one hospital with an HAASC, a special committee of the medical staff had been established to conduct the reviews of ambulatory surgical cases. All reviews were performed with a combination of a spot check method and a random sample of cases on a periodic basis.

The FSASC had established a Medical Audit Team (MAT) to provide the utilization review and tissue review functions for the facility. This team was created in voluntary agreement between the FSASC and the Health Planning Council. The purpose of the team was to review surgical procedures and practices employed in the facility and to recommend standards equivalent to accredited community general hospitals in the local area. Six members serve on the team and are appointed on a rotating basis for 18 months after recommendation by the surgical specialty societies. The team is composed of one representative from each of the following medical specialties.

- Urology
- Obstetrics and Gynecology
- Pediatric Surgery
- Otolaryngology
- Oral Surgery
- Ophthamalogy.

The MAT reviews records on both a spot check and periodic basis for a sample of medical records.[8] Reports on the status of medical record completion and facility utilization are forwarded to the members of the team. The MAT essentially serves in an advisory capacity to the owners/directors of the FSASC. According to the owner/directors, the MAT does not have available any cumulative statistical reporting on either the characteristics and problems associated with procedure types or on the practice characteristics and profiles of individual surgeons using the facility.

Summary of Findings. The following were the salient findings with respect to utilization review:

- All facilities in the study had a formal organizational arrangement for utilization review. In the hospitals, review of ambulatory surgery was generally conducted as an adjunct to review of inpatient records. In the FSASC, however, a Medical Audit Team -- a voluntary body composed of members selected by the surgical subspecialty societies -- reviewed the practices and activities in the facility.

Physical Characteristics of Alternative Surgical Settings

The four institutionally-based surgical settings were observed to have specific differences in the physical characteristics of the facilities. These differences are discussed in terms of location, functional space allocations, and equipment inventories.

Location - The location of a surgical facility has major implications for the definition of its service area, the types of patients that are treated, and the physician community that it serves. Furthermore, when freestanding facilities are considered, the location takes on additional importance with respect to the accessibility to emergency backup facilities. This is, of course, not an issue as far as hospital inpatient and hospital outpatient facilities are concerned because they are located within the hospital complex for the facilities included in the study. The FSASC and the two HAASCs were all physically separate structures. It would appear that from a strictly locational standpoint none enjoys a relative advantage over any other in proximity to the hospital. The FSASC and one HAASC are located directly across the street from the inpatient facilities. The other HAASC must transport patients across the hospital parking lot to gain entrance to the emergency room if required. The HAASCs have a minor administrative advantage should a transfer to inpatient or emergency facilities be required in that the patient is already admitted and accepted as a patient at the hospital. On the other hand, the FSASC had formal transfer agreements with nearby hospitals that insured acceptance and treatment of a patient if a transfer was required.

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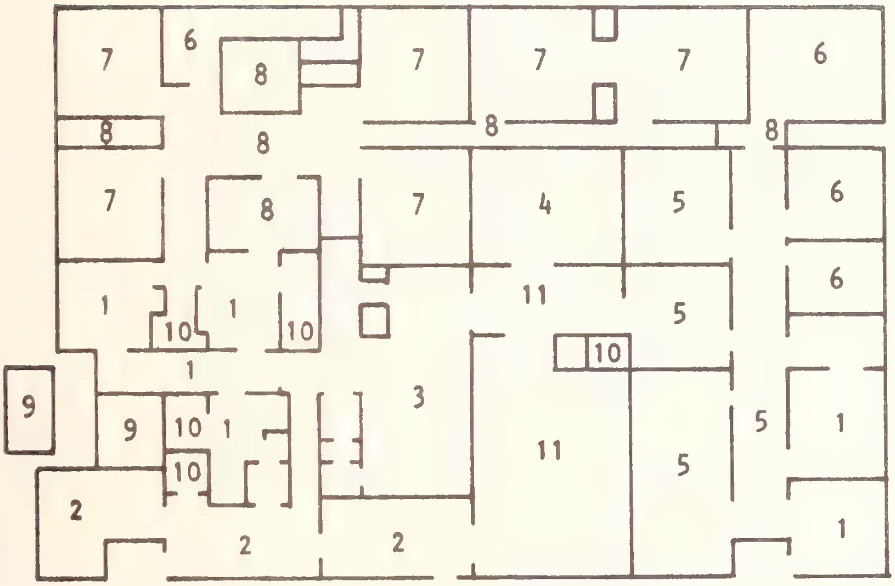
[8] MAT meetings are normally held every 6 months, and between 25 and 50 records are reviewed. The records are pulled from the files on a consecutive basis after a random start.

Space Allotments - All inpatient and traditional outpatient surgical settings provide preoperative areas, operating suites, and postoperative areas or recovery rooms. For inpatients, preoperative work is done in the patient's room on the nursing ward. Generally, in the outpatient setting the preoperative area was set aside near the emergency room. In the FSASC and one HAASC, separate areas were designated for preoperative, operative, and postoperative care. In one HAASC the preoperative and postoperative areas were combined. The FSASC provided a separate postoperative area with cribs for children. Neither of the HAASCs had a separate space for children although movable curtains could be used to partition off individual beds. Exhibits IV-6 and IV-7 present the floorplans of the FSASC and one of the HAASC settings.

Equipment - Exhibit IV-8 inventories ten selected items of equipment used in either the operating room or recovery room in the treatment of surgical patients for each of the facilities included in the study. As can be seen from the inventory, there appeared to be little variation in the type of equipment available across the surgical settings and between facilities. The FSASC and the HAASCs were remarkably similar in both the types and number of specific items. The

Exhibit IV-6

Floorplan of FSASC Facility



(1) STAFF AND DOCTORS' LOUNGE
(2) PATIENT ADMISSION AND LOBBY
(3) PREOPERATIVE AREA
(4) PEDIATRIC RECOVERY
(5) FORMER PAIN CLINIC RENOVATED TO PROVIDE ADDITIONAL RECOVERY ROOM BEDS
(6) STORE ROOM
(7) OPERATING ROOM
(8) STERILE AREA
(9) MECHANICAL
(10) BATHROOM AND SHOWERS
(11) ADULT RECOVERY

Exhibit IV-7

Floorplan of HAASC Facility

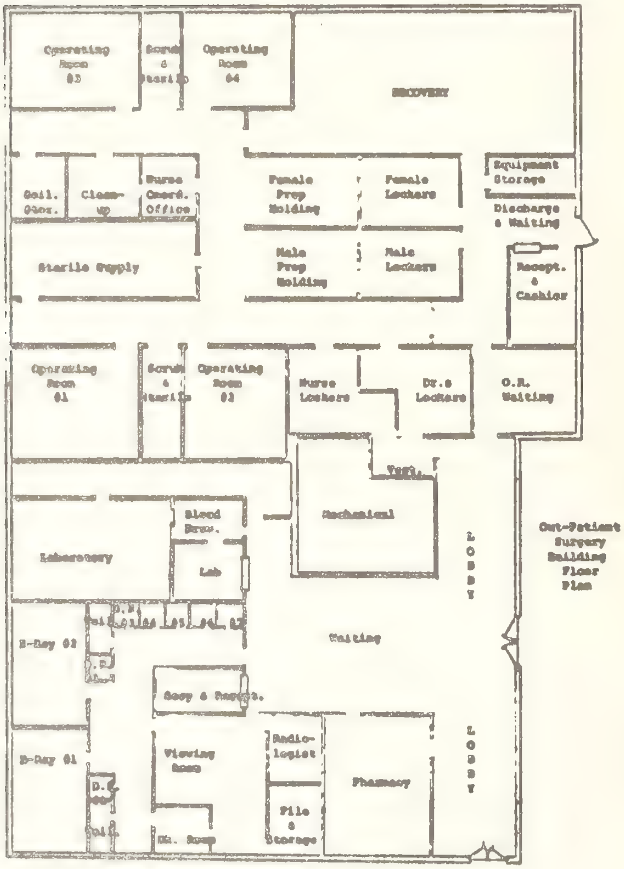


Exhibit IV-8

Inventory of Ten Selected Equipment Items in Alternative Surgical Settings

	IP AND OP #1	IP AND OP #2	IP AND OP #3	IP AND OP #4	HAASC #1	HAASC #2	FSASC
Cardiac Monitor	YES	YES	YES	YES	1 per room	5 for all	2 for OR suite
Defibrillator	YES	1 only	YES	on crash cart	1 only	1 only	1 only
Oxygen Equip.	YES	YES	YES	YES	YES	YES	Uses Anesth. Machine
Laryngoscope	YES	1 per room	1 per room	Anesth. has own	YES	Anesth. has own /on crash cart	Anesth. has own
Endotracheal Tube	YES	YES	YES	YES	YES	YES	Anesth. has own
Tracheotomy set	YES	on crash cart	in central supply	in central supply	1 in RR	YES	on crash cart
Suction Apparatus	YES	YES	YES	YES	YES	YES	YES
Electrocardiogram	YES	1 only	in lab	Telephonic	1 only	1 only	1 only
Emergency Drug Tray	YES	1 only	YES	1 per person	1 only	1 only	1 only
Resuscitator	YES	YES	in central supply	YES	1 only	1 only	1 only

Source: Facility Survey Reports

FSASC and both HAASCs each had one electrocardiogram, emergency drug tray, and resuscitator for their facility. The FSASC had two cardiac monitors for the six room operating suite, whereas the HAASCs had a monitor for each operating room. The inpatient and outpatient surgical settings used the main operating room suite for all surgery cases. As would be expected, there is a greater availability in terms of the number of equipment items for these facilities. However, no major differences in the equipment inventory applicable to minor surgery within or between surgical settings was noted.

Summary of Findings. The following were the important findings with respect to the physical characteristics of surgical facilities across the various settings:

- The hospital inpatient and traditional outpatient surgical facilities were physically in the same complex as the backup or supporting equipment and facilities. Among the HAASC and FSASC facilities, there was almost no difference in the physical proximity to these.

- No major differences were detected in the types of equipment applicable to minor surgery available across the surgical settings.

Patient Care Policies of Facilities

All of the institutions included in the study had established written policies regarding patient care in the facilities. However, there was considerable variation in the detail and comprehensiveness of the policies, particularly as related to minor surgical patients. For the hospitals with HAASC settings and for the FSASC, the ambulatory surgical patient policies were generally more explicit. In inpatient facilities and traditional outpatient settings one set of policies generally covered both the IP and OP settings. Exhibit IV-9 shows the presence or absence of specific written policies for the facilities and settings in the thirteen specific items. Substantial variation across facilities and settings was observed for four policy items.

The HAASC and FSASC settings had an explicit scheduling policy for minor surgical patients. However, in three of the four OP settings no specific scheduling policy was present and

Exhbit IV-9

Selected Characteristics of Patient Care Policies by Surgical Setting and Facility

Characteristic	Surgical Setting and Facility												
	Inpatient						Outpatient				HAASC		FSASC
	#1	#2	#3	#4	#5	#6	#1	#2	#3	#4	#1	#2	
1.0 Policies*													
1.1 Are patients admitted to the facility only on the recommendation of a physician?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
1.2 Is there a policy for the scheduling of minor surgical patients?	no	yes	yes	yes	no	yes	no	yes	no	no	yes	yes	yes
1.3 Is there a policy concerning the holding of consultations with respect to minor surgical procedures?	Only for D&C		yes	no	Only for abortions	yes	Only for D&C	no	Only for abortions	yes	no	yes	no
1.4 Do patients receive written instructions regarding eating prior to surgery and admission procedures?	yes		no	yes	no	yes	yes	yes	no	no	yes	yes	yes
1.5 Does the facility have written policies concerning the admission of patients for surgical procedures?	yes	yes	yes	no	yes	no	yes	no	yes	no	yes	yes	yes
1.6 Have specific indications been developed for each surgical procedure?	no		yes	no	no	no	no	no	no	no	no	yes	no
1.7 Is there a policy on what constitutes an adequate pre-operative work-up for minor surgical patients?	no	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	no
1.8 Is a properly-executed consent form for the operation in the patient's chart prior to surgery?	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
1.9 Are rules and regulations and/or policies related to the operating rooms available and posted?	yes	yes	yes	no	yes	yes	yes	no	yes	yes	yes	yes	no
1.10 Does the facility have a written policy regarding discharge of the patient from the Recovery Room?	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Source: Facility Survey Reports

*As used in this report, the term "policy" connotes that a facility has explicitely adopted a written position or statement on a particular issue. A "yes" in a particular cell does not indicate what the policy is, but only that the facility has addressed this issue with an explicit written statement.

Exhibit IV-9 — Cont.

Characteristic	Surgical Setting and Facility												
	Inpatient						Outpatient				HAASC		FSASC
	#1	#2	#3	#4	#5	#6	#1	#2	#3	#4	#1	#2	
1.11 Is it the policy of the facility that only a physician may discharge a patient from the Recovery Room?	no	yes	yes	no	no		no	no	no		yes	yes	yes
1.12 An anesthesiologist is responsible for all anesthetics administered in the facility.	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

the scheduling of a procedure was strictly a function of the availability of the main operating rooms, with inpatient surgeries taking priority in the schedule. One of the HAASC settings had a formal policy for the holding of consultations for minor surgical procedures. Four of the six IP settings also had consultation policies for all procedures or specific procedure types as did three of the four OP settings. The FSASC did not have a consultation policy. In light of the elective nature of the surgery performed at the FSASC, the absence of a consultation policy for at least selected types of procedures or patients may warrant further study and consideration.

In the HAASC and FSASC settings, patients scheduled for surgery received, as a matter of policy, written instructions regarding food and drink restrictions and admission procedures. The consistent provision of this information was not a standard policy in two of the four OP settings and two of the six IP settings.

In the HAASC and FSASC settings only a physician could discharge a patient from the recovery room; however in the OP and IP settings the discharge authority is in some cases delegated to the nursing staff of the facility.[9]

Summary of Findings. From the review of selected patient care policies as given by the facilities included in the study, it was found that:

- The facilities that had ambulatory surgical centers generally had more detailed and comprehensive policies for the care of minor surgical patients than IP or OP surgical settings.
- The policies of the HAASC and FSASC appeared to be at least as protective of the patients' safety and as careful about the patients' condition prior to discharge as the IP and OP settings.

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[9] In the facilities where a nurse is authorized to discharge a patient, detailed guidelines are either drawn up by the anesthesiologist for each patient, or the facility's standing criteria or point system are used to assure that a patient is in a condition appropriate for discharge. In cases where there is any question, a physician is called.

Patient Care Policies as Expressed by a Sample of Maricopa County Physicians

As described in detail in the methodological appendix, a questionnaire was sent to physicians in Maricopa County to collect information on the physicians' perceptions of appropriate patient care policies and practices for the twelve surgical procedures included in the study. The questionnaire focused on five specifed areas of surgical patient care practices: appropriate surgical settings for the surgery; appropriate clinical laboratory tests to be performed; special tests and monitoring before and during the operation; requirements for general anesthesic; and appropriateness of pathology examination of tissue removed from the patient. In this section, each of these aspects of physician responses to the questions are discussed.

Appropriateness of Surgical Setting. The appropriateness of surgical setting was a multi-response item in that a physician could respond that one or more of the five alternative settings were appropriate for the particular procedure under consideration. Exhibit IV-10 shows the results of the tabulation of responses. The procedure-specific responses are discussed in the following paragraphs:

Myringotomy and Adenoidectomy - Of the eleven physicians that reported they performed the procedure, 81.8% identified the IP setting and the HAASC setting as appropriate surgical settings. Sixty three percent felt the FSASC setting was appropriate, and 54.5% reported the OP setting as appropriate. Only one of the eleven physicians felt the physician's office setting was appropriate for this procedure.

Tonsillectomy and Adenoidectomy - Of the twelve procedures included in the study, this procedure was considered the least appropriate for the ambulatory settings. Of the eighteen physicians that reported performing this procedure, 88.9% felt the IP setting was appropriate while 27.8% reported the OP setting as appropriate and 44.4% reported the HAASC and FSASC settings. Only one physician reported the office as an appropriate setting.

Exhibit IV-10

Percent of Physicians in the Sample Reporting Surgical Settings as Appropriate for Twelve Procedures

	Setting					
Procedure	IP	OP	HAASC	FSASC	PHYS OFFICE	# of Physician Responses
Myringotomy with Adenoidectomy	81.8%	54.5%	81.8%	63.6%	9.1%	11
Tonsillectomy and Adenoidectomy	88.9	27.8	44.4	44.4	5.6	18
Dilation and Curettage	63.8	65.5	86.8	98.3	15.5	58
Laparoscopy with BTC	84.4	78.1	90.6	96.9	3.1	32
Excision of Breast Mass	61.9	42.9	71.4	66.7	4.8	21
Ganglionectomy	41.9	61.3	77.4	93.5	12.9	31
Inguinal Herniorrhapy	89.5	21.1	57.9	52.6	0.0	19
Vasectomy	12.5	50.0	54.2	75.0	91.7	24
Circumcision	75.0	33.3	41.7	58.3	8.3	12
Augmentation Mammoplasty	44.4	88.9	88.9	88.9	55.6	9
Advancement or Recession of Eye Muscle	88.9	38.9	55.6	66.7	0.0	18
Excision of Lipoma or Sebaceous Cyst	19.5	46.3	56.1	65.9	78.0	41

Source: Physician Questionnaires

Dilation and Curettage - This procedure was generally reported as appropriate for ambulatory settings by the 58 responding physicians. The FSASC and HAASC were the most appropriate settings with 98.3% and 86.8% of the physicians responding favorably to these settings. Interestingly, the OP setting was reported as appropriate by substantially fewer physicians (65.5%), approximately the same proportion (63.8%) that reported the IP setting as appropriate. Again, the office setting was seen as appropriate by a relatively small proportion of the physicians, with only 15.5% giving approval to that setting.

Laparosopy with BTC - All of the institutionally-based settings were seen as appropriate by the large majority of the 32 physicians that performed this procedure. The FSASC setting achieved the highest approval rate with 96.9%. The office setting was seen as clearly not appropriate for this procedure.

Excision of Breast Mass - The 21 physicians that responded to specific questions for this procedure were somewhat divided with two thirds reporting the FSASC setting as appropriate and somewhat less than two thirds (61.9%) reporting the IP setting as appropriate. The setting with the highest approval rate was the HAASC with 71.4% of the physicians categorizing it as appropriate. Only 4.8% of the physicians reported the office as an appropriate setting for this procedure.

Ganglionectomy - Ambulatory settings, particularly HAASC and FSASC settings, were clearly reported as the most appropriate settings for this procedure. Only 41.9% of the physicians felt the IP setting was appropriate and only four of the 31 physicians reported the office as an appropriate setting.

Inguinal Herniorrhaphy - Of the twelve surgical procedures, a greater proportion of physicians identified the IP setting as appropriate for this procedure than for any other. Almost ninety percent of the physicians described the IP setting as appropriate whereas 57.9% and 52.6% of the nineteen responding physicians felt the HAASC and FSASC settings respectively were appropriate. As in the case for all procedures of the institutionally based ambulatory settings, the OP setting was described as appropriate by the smallest proportion of physicians (21.1%). None of the physicians reported the office setting as appropriate for this procedure.

Vasectomy - Of the 24 physicians that reported performing this procedure, 22 (91.7%) listed the office setting as appropriate. Conversely, the IP setting was identified as appropriate by only 12.5%. With regard to the ambulatory hospital-based settings the response was split with one-half the physicians reporting the OP setting as appropriate and 54.2% for the HAASC. Three-quarters of the responding physicians identified the FSASC as an appropriate setting.

Circumcision - The IP setting was reported most frequently as an appropriate setting with 75.0% of the 12 physicians responding. Only one of the physicians felt the office setting was appropriate for this procedure. The FSASC was described as appropriate by larger proportions of physicians (58.3%) than were either the HAASC (41.7%) or the OP setting (33.3%).

Augmentation Mammoplasty - Only nine physicians responding to the questionnaire reported performing this procedure. Of the nine, eight physicians described the OP, HAASC and FSASC setting as appropriate. Four felt the IP setting was appropriate while five physicians listed the office as an appropriate setting.

Advancement or Recession of Eye Muscle - More physicians reported the IP setting as appropriate for this procedure than any other surgical setting. None of the 18 physicians described the office as an appropriate setting. Among the institutionally-based ambulatory settings the FSASC was described as appropriate by two-thirds of the responding physicians whereas 55.6% endorsed the HAASC setting and only 38.9% felt the hospital OP setting was appropriate.

Excision of Lipoma or Sebaceous Cyst - The physician's office setting was the setting most frequently listed as appropriate by the 41 physicians that reported performing the procedure with 78.0% The IP setting was identified as appropriate by only 19.5% of the physicians. The FSASC was listed as appropriate by 65.9% of the sample and smaller proportions for the HAASC and OP settings.

Need for Specific Clinical Laboratory Tests. The results of the analysis of physician responses regarding the need for specific clinical laboratory tests is given in Exhibit IV-11. Specific tests studied included urinalysis (dipstick and microscopic), hemoglobin, hematocrit, white blood cell count, differential and complete blood cell count. However, responses from physicians also listed coagulation time, PT, PTT, platelet count, pregnancy test, blood chemistry, and blood type and cross match for each surgical procedure included in the evaluation. The results for individual tests and combinations of tests are discussed in the following paragraphs.

Urinalysis - Physicians surveyed felt that a dipstick urinalysis should be generally required for most of the procedures included in the study. For all but two procedures the majority of the physicians felt this test should be performed prior to surgery. Only for excision of lipoma or sebaceous cyst and vasectomy did less than fifty percent of the responding physicians feel that this test should not generally be required. It should be noted that these two procedures were also described as appropriate for the office setting and are frequently done under general anesthesia.

The physicians surveyed most frequently stated that a microscopic urinalysis should be generally required for myringotomy with adenoidectomy(63.6%), tonsillectomy and adenoidectomy (77.8%), and inguinal herniorrhaphy (70.0%). Responses were split for advancement or recession of eye muscle with 52.9% of the responding physicians preferring a microscopic urinalysis. For all other procedures, this test was identified as should be performed by less than 35% of the physicians who perform the surgical procedure.

Hemoglobin and Hematocrit - For all except three procedures a majority of the responding physicians felt that either a hemoglobin or hematocrit test should be generally required. Vasectomy, circumcision, and excision of lipoma or sebaceous cyst were not reported to require the test. For several other procedures there was incomplete agreement on the necessity of these tests. The highest proportion of physicians (72.4%) reported the need for a hemoglobin test for dilation and curettage patients. However, most of the procedures ranged from 55% to 67%.

Proportion of Physicians Reporting that a Clinical Laboratory Test Should be Performed, by Procedure and Specific Test

PROCEDURE	URINALYSIS		HEMO-GLOBIN	HEMATO-CRIT	WBC	DIFFEREN-TIAL	CBC	COAGULA-TION TIME PT., PTT	PLATELETS	PREG. TEST	TYPE & CROSS-MATCH	BLOOD CHEMISTRY	# OF PHYSICIAN RESPONSES
	DIPSTICK	MICRO											
Myringotomy with Adenoidectomy	54.5%	63.6%	27.3%	54.5%	36.4%	36.4%	59.5%	45.5%	9.1%	0.0%	0.0%	0.0%	11
Tonsillectomy and Adenoidectomy	61.1	77.8	55.6	66.7	55.6	50.0	83.3	66.7	5.5	0.0	0.0	0.0	18
Dilation and Curettage	74.1	34.5	72.4	62.1	34.5	17.2	29.3	1.8	0.0	5.2	0.0	0.0	58
Laparoscopy with BTC	78.1	34.4	65.6	65.6	25.0	6.3	18.7	0.0	0.0	3.2	0.0	0.0	32
Excision of Breast Mass	71.4	33.3	61.9	42.9	38.1	23.8	33.3	0.0	0.0	0.0	4.8	0.0	21
Ganglionectomy	80.0	23.3	67.7	63.3	33.3	13.3	23.3	0.0	0.0	0.0	0.0	0.0	30
Inguinal Herniorrhapy	55.0	70.0	55.0	40.0	45.0	25.0	55.0	0.0	0.0	0.0	0.0	15.0	20
Vasectomy	47.8	34.8	13.0	26.1	17.4	8.7	13.0	0.0	0.0	0.0	0.0	0.0	23
Circumcision	53.8	23.1	46.2	38.5	23.1	23.1	30.8	0.0	0.0	0.0	0.0	0.0	13
Augmentation Mammoplasty	77.8	11.1	55.6	66.7	33.3	22.2	33.3	0.0	0.0	0.0	0.0	0.0	9
Advancement or Recession of Eye Muscle	70.6	52.9	58.8	64.7	58.8	35.3	35.3	0.0	0.0	0.0	0.0	0.0	17
Excision of Lipoma or Sebaceous Cyst	30.6	19.4	33.3	33.3	19.4	11.1	19.4	0.0	0.0	0.0	0.0	0.0	36

Source: Physician Questionnaires

White Blood Cell Count - For most procedures, this test was not reported to be generally required. However for advancement and recession of eye muscle, and tonsillectomy and adenoidectomy, 58.8% and 55.6% of the physicians felt a WBC should be performed. The response for inguinal herniorrhaphy was somewhat mixed with 45.0% of the physicians preferring this test.

Differential - The procedures for which the largest proportion of physicians reported that this test should be performed was tonsillectomy and adenoidectomy with nine of the 18 physicians preferring a differential. Myringotomy with adenoidectomy and advancement or recession of eye muscle were the next most frequently reported procedures for this test with 36.4% and 35.3% responses respectively.

Complete Blood Count - Tonsillectomy and adenoidectomy, inguinal herniorrhaphy, and myringotomy with adenoidectomy each had a majority of physicians reporting that a CBC should generally be performed prior to the surgery. A CBC was most frequently listed for the tonsillectomy and adenoidectomy procedure with 83.3% of the physicians responding positively.

Of the other laboratory tests reported by the physicians responding to the questionnaire, only coagulation time, PT, and PTT tests showed a significant concentration of responses. Two thirds of the physicians who performed tonsillectomy and adenoidectomy thought one or more of these tests should generally be performed prior to surgery. For myringotomy with adenoidectomy, 45.5% of the physicians thought these tests should be required.

Special Tests, Monitoring, and Anesthesia. Exhibit IV-12, on the following page, presents the distribution of physician responses with respect to the need for a chest x-ray, electro-cardiogram (EKG), an electronic cardiac monitor during the surgery, and the estimated percent of patients requiring general anesthesia for the procedure.

As can be seen from the exhibit, only three procedures were thought to generally require a pre-operative chest x-ray by more than half of the responding physicians: excision of breast mass (60.0%), inguinal herniorrhaphy (70.0%), and advancement or recession of eye muscle (64.7%). The next two most frequently reported procedures were circumcision with 46.2% and tonsillectomy and adenoidectomy with 44.4%.

Exhibit IV-12

Proportion of a Sample of Maricopa County Physicians Reporting That Chest X-Ray, EKG, Electronic Cardiac Monitor, and General Anesthesia Should be Required, by Procedure

PROCEDURE	CHEST X-RAY	EKG	ELECTRONIC CARDIAC MONITOR	% REQUIRING GENERAL ANESTHESIA	# PHYSICIANS RESPONDING
Myringotomy with Adenoidectomy	36.4%	27.3%	54.5%	73.1%	11
Tonsillectomy and Adenoidectomy	44.4	22.2	52.9	96.7	18
Dilation and Curettage	21.1	19.3	37.9	84.7	58
Laparoscopy with BTC	15.6	9.4	58.1	79.7	32
Excision of Breast Mass	60.0	40.0	42.9	62.0	21
Ganglionectomy	30.0	10.0	23.3	66.5	30
Inguinal Herniorrhapy	70.0	57.9	57.9	74.8	20
Vasectomy	4.3	0.0	4.3	5.8	23
Circumcision	46.2	30.8	15.4	50.8	13
Augmentation Mammoplasty	33.3	22.2	55.6	13.7	9
Advancement or Recession of Eye Muscle	64.7	5.9	70.6	84.0	17
Excision of Lipoma or Sebaceous Cyst	7.1	4.8	11.9	13.2	36

Source: Physician Survey Questionnaires

Note: Information on the radiological policies of the twelve surgical settings and facilities is presented in Exhibit IV-4.

An EKG was generally not regarded as necessary for most of the procedures included in the study. Only for inguinal herniorrhaphy did a majority of physicians feel an EKG should be performed (57.9%). However, opinion was also somewhat divided for excision of breast mass where 40.0% of the physicians felt that an EKG should generally be performed.

For six of the twelve procedures a majority of physicians reported that an electronic cardiac monitor should be used during the surgery. For vasectomy, circumcision, and excision of lipoma or sebaceous cyst a cardiac monitor was generally not reported as necessary, however. Interestingly, for dilation and curettage, the most frequently performed procedure in the ambulatory setting, only 37.9% of the physicians reported that an electronic cardiac monitor was needed during surgery.

All but four of the twelve surgical procedures were reported by physicians to require general anesthesia for more than 60% of the cases. Vasectomy was reported to be the procedure least frequently requiring a general anesthetic (5.8%) followed by excision of lipoma or sebaceous cyst (13.2%) and augmentation mammoplasty (13.7%). Approximately one-half of the circumcision patients were thought to require general anesthesia by the physicians responding to the questionnaire.

Pathology Examination of Tissue. Exhibit IV-13 shows the responses of physicians to a question regarding the need for a pathologist to examine the tissue removed from patients for each of the twelve surgical procedures. As can be seen from the distribution, there was some difference among the procedures with regard to this issue. Pathology examination was reported to either be performed in all cases or at the discretion of the surgeon for all but three procedures. For vasectomy, circumcision, and the eye muscle procedures 4.3%, 7.7% and 16.7% of the physicians felt a pathology test should not be required.

The two procedures for which the highest proportion of physicians reported that a pathology examination should be required in all cases was dilation and curettage (87.9%) and breast mass excision (85.0%). This is not surprising in that both of these procedures may be employed as a diagnostic procedure for the detection of cancer. The eye muscle procedure,

Exhibit IV-13

Proportion of a Sample of Maricopa County Physicians Reporting a Pathology Examination of Tissue Should be Required, by Procedure

PROCEDURE	SHOULD BE REQUIRED	DISCRETION OF SURGEON	SHOULD NOT BE REQUIRED	TOTAL
Myringotomy with Adenoidectomy	54.5%	45.5%	0.0%	100.0%
Tonsillectomy and Adenoidectomy	64.7	35.3	0.0	100.0%
Dilation and Curettage	87.9	12.1	0.0	100.0%
Laparoscopy with BTC	67.7	32.3	0.0	100.0%
Excision of Breast Mass	85.0	15.0	0.0	100.0%
Ganglionectomy	66.7	33.0	0.0	100.0%
Inguinal Herniorrhapy	50.0	50.0	0.0	100.0%
Vasectomy	65.2	30.4	4.3	100.0%
Circumcision	53.8	38.5	7.7	100.0%
Augmentation Mammoplasty	66.7	33.3	0.0	100.0%
Advancement or Recession of Eye Muscle	5.6	77.8	16.7	100.0%
Excision of Lipoma or Sebaceous Cyst	50.0	50.0	0.0	100.0%

Source: Physician Survey Questionnaires

inguinal herniorrhaphy, and myringotomy with adenoidectomy were the procedures where the discretion of the surgeon was most frequently reported as the physician response with 77.8%, 50.0% and 45.5% of the responses in this category for the respective procedures.

Conditions Under Which Procedures Should be Performed in an Inpatient Setting or Office Setting

Exhibit IV-14 shows the distribution of conditions under which physicians felt that the twelve surgical procedures should be performed on an inpatient basis. As can be seen from the distributions, the most frequently reported reason for a procedure to be performed in an inpatient setting in ten of the twelve procedures was one or more of preexisting patient conditions. For excision of breast mass, the potential of malignancy was reported as a reason for selecting an inpatient setting for 35.5% of the responses given. Technical characteristics of the procedure including cyst location and size were the most frequently mentioned reasons for using the inpatient setting for the excision of lipoma or sebaceous cyst.

Exhibit IV-15 shows the distribution of responses for the reasons a procedure may be done in an office setting. Augmentation mammoplasty and excision of lipoma or sebaceous cyst are the only two procedures where the most frequent response was other than "never" or "always". Half of the responses for augmentation mammoplasty reported an office setting should be selected only if fully equipped, in effect providing a replication of an IP, HAASC, or FSASC operating room. For lipoma or sebaceous cyst excisions, characteristics of the procedure was the most frequently reported reason.

Summary of Findings. Based on the responses to the physician questionnaire with respect to patient care policies, it was found that:

- The hospital outpatient setting was less frequently reported as appropriate for all twelve procedures than either the HAASC or FSASC settings.

Exhibit IV-14

Conditions Under Which a Procedure Should Be Performed In the Inpatient Setting

CONDITION \ PROCEDURE	Adenoidectomy and Myringotomy		Tonsillectomy and Adenoidectomy		Dilation and Curettage		Laparoscopy with B T C		Breast Mass Excision		Ganglionectomy		Inguinal Herniorrhaphy		Vasectomy		Circumcision		Augmentation Mammoplasty		Eye Muscle		Excision of Lipoma or Sebaceous Cyst	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Always	0	0.0	5	21.7	0	0.0	0	0.0	0	0.0	1	2.5	3	10.0	0	0.0	2	9.5	0	0.0	1	3.8	1	1.6
Pre Existing Conditions	10	58.8	7	30.4	67	57.6	36	63.2	0	0.0	16	40.0	10	33.3	14	48.3	7	33.3	7	50.0	12	46.2	14	23.0
Potential Complications	2	11.8	0	0.0	11	9.4	7	12.3	5	16.1	4	10.0	0	0.0	0	0.0	3	14.3	2	14.3	0	0.0	2	3.3
Potential Malignancy	0	0.0	0	0.0	3	2.6	0	0.0	11	35.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	3.3
Procedure Specific Characteristics	0	0.0	0	0.0	13	11.2	3	5.3	3	9.7	3	7.5	4	13.3	4	13.8	1	4.8	0	0.0	2	7.7	25	41.0
Medications in Current Use	0	0.0	0	0.0	1	.9	1	1.8	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Abnormal Lab Findings	0	0.0	0	0.0	0	0.0	0	0.0	1	3.2	0	0.0	1	3.3	0	0.0	0	0.0	0	0.0	0	0.0	1	1.6
Patient Age	2	11.8	4	17.4	9	7.8	1	1.8	8	25.8	7	17.5	10	33.3	0	0.0	4	19.0	1	7.1	3	11.5	1	1.6
Patient Weight	0	0.0	0	0.0	2	1.7	3	5.3	0	0.0	0	0.0	0	0.0	1	3.4	0	0.0	0	0.0	0	0.0	0	0.0
Home Care Availability or Need for Supervision	1	5.8	4	17.4	3	2.6	2	3.5	0	0.0	2	5.0	0	0.0	0	0.0	0	0.0	3	21.4	5	19.2	1	1.6
Insurance Coverage	2	11.8	1	4.3	5	4.3	4	7.0	0	0.0	1	2.5	0	0.0	0	0.0	0	0.0	0	0.0	1	3.8	1	1.6
Cost Considerations	0	0.0	1	4.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Patient Preference	0	0.0	0	0.0	1	.9	0	0.0	2	6.5	3	7.5	2	6.7	3	10.3	3	14.3	0	0.0	2	7.7	1	1.6
Other	0	0.0	1	4.3	1	.9	0	0.0	1	3.2	0	0.0	0	0.0	2	6.9	1	4.8	0	0.0	0	0.0	2	3.3
Never	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	7.5	0	0.0	5	17.2	0	0.0	1	7.1	0	0.0	10	16.4
Total Responses	17	100.0%	23	99.8%	116	99.9%	57	100.0%	31	100.0%	40	100.0%	30	99.9%	29	99.9%	21	100.0%	14	99.9%	26	100.0%	61	99.9%

Source. Physician Questionnaires

Exhibit IV-15

Conditions Under Which a Procedure Should Be Performed In the Physician's Office Setting

PROCEDURE / CONDITION	Adenoidectomy and Myringotomy		Tonsillectomy and Adenoidectomy		Dilation and Curettage		Laparoscopy with B T C		Breast Mass Excision		Ganglionectomy		Inguinal Herniorrhaphy		Vasectomy		Circumcision		Augmentation Mammoplasty		Eye Muscle		Excision of Lipoma or Sebaceous Cyst	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Always	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	6	25.0	1	7.7	1	12.5	0	0.0	7	14.0
Patient Health Good	0	0.0	0	0.0	4	7.6	2	7.1	0	0.0	0	0.0	0	0.0	3	12.5	0	0.0	0	0.0	0	0.0	2	4.0
Lack of Potential Complications	0	0.0	0	0.0	3	5.7	0	0.0	2	9.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	4.0
Procedure Specific Characteristics	0	0.0	0	0.0	5	9.4	0	0.0	2	9.5	2	6.7	0	0.0	1	4.2	1	7.7	1	12.5	0	0.0	19	38.0
Patient Age	0	0.0	0	0.0	0	0.0	0	0.0	1	4.8	0	0.0	0	0.0	0	0.0	1	7.7	0	0.0	0	0.0	0	0.0
Patient Weight	0	0.0	0	0.0	2	3.8	1	3.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
No Insurance Coverage	0	0.0	0	0.0	1	1.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	4.0
Cost	0	0.0	1	5.9	0	0.0	0	0.0	2	9.5	0	0.0	0	0.0	3	12.5	1	7.7	0	0.0	0	0.0	1	2.0
Fully Equipped M.D. Office	0	0.0	0	0.0	1	1.9	0	0.0	0	0.0	5	16.7	0	0.0	2	8.3	0	0.0	4	50.0	0	0.0	5	10.0
Patient Preference	0	0.0	0	0.0	1	1.9	0	0.0	0	0.0	0	0.0	0	0.0	1	4.2	0	0.0	0	0.0	0	0.0	1	2.0
Physician Preference	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	4.2	0	0.0	0	0.0	0	0.0	1	2.0
Other	0	0.0	0	0.0	2	3.8	0	0.0	0	0.0	0	0.0	0	0.0	6	25.0	0	0.0	0	0.0	0	0.0	3	6.0
Home Care Availability	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	4.2	0	0.0	0	0.0	1	6.7	1	2.0
Never	11	100.0	16	94.1	34	64.2	25	89.3	14	66.7	23	76.7	17	100.0	0	0.0	9	69.2	2	25.0	14	93.3	6	12.0
Total Responses	11	100.0%	17	100.0%	53	100.2%	28	100.0%	21	100.0%	30	100.1%	17	100.0%	24	100.1%	13	100.0%	8	100.0%	15	100.0%	50	100.0%

Source Physician Questionnaires

- For eleven of the twelve surgical procedures, the majority of physicians responding reported the FSASC as an appropriate setting for surgery. For tonsillectomy and adenoidectomy, only 44.4% of the physicians listed the FSASC setting as appropriate. It should be noted that the appropriateness designation was made based only on the surgical procedure type without regard to patient characteristics.

- Vasectomy, excision of lipoma or sebaceous cyst and augmentation mammoplasty were reported as appropriate procedures for the physicians office setting by 91.7%, 78.0%, and 55.6% of the physician's respectively. None of the other twelve procedures were listed as appropriate in the physician office setting by more than 16% of the physician sample. This does not imply that, given certain patient or clinical characteristics, other settings are necessarily inappropriate.

- Dipstick urinalysis and hemoglobin or hematocrit were the clinical laboratory tests most frequently reported as necessary for minor surgical patients undergoing the twelve procedures included in the study. However, for myringotomy with adenoidectomy, tonsillectomy and adenoidectomy, inguinal herniorraphy, and advancement or recession of eye muscle, more than one-half of the physicians also felt a microscopic urinalysis should be performed. A white blood cell count was reported by a majority of physicians as necessary for tonsillectomy and adenoidectomy and the eye muscle procedures. A complete blood count was reported as necessary for myringotomy with adenoidectomy, tonsillectomy with adenoidectomy, and inguinal herniorrhaphy. A coagulation time test was also listed by an majority of physicians for the tonsillectomy and adenoidectomy procedure.

- The FSASC setting performed the two clinical laboratory tests most frequently reported as "should be performed" (dipstick urinalysis and hemoglobin/hematocrit). However, the FSASC setting, considering that a microscopic urinalysis, white blood cell count, and complete blood cell count were not routinely performed, did not necessarily meet all the clinical laboratory requirements for some selected procedures as identified by a majority of the physician sample.

- Chest x-rays were reported by a majority of responding physicians as preferred for only three procedures: breast mass excision (60.0%) inguinal herniorraphy (70.0%) and eye muscle operation (64.7%)
- Inguinal herniorraphy was the only procedure where more than one-half of the physicians reported that an EKG should be performed prior to surgery (57.9%)
- For six of the twelve procedures, a majority of the physician sample reported that an electronic cardiac monitor should be used.
- For all of the twelve procedures, a majority of the physician sample reported that pathology examination of tissues should be performed either in all cases or at the discretion of the surgeon.

FINDINGS: PROCESS QUALITY

The objective of the process quality evaluation was to compare patient treatment characteristics across the four surgical settings included in the evaluation and identify differences in the characteristics of patients undergoing the twelve specific types of surgical procedures. As discussed in the methodology section of this chapter, twelve surgical procedures were selected for intensive study using a variety of data collection techniques and information sources. Before the procedure-specific characteristics are presented, the operational definition of process quality and some basic differences between settings in the care of surgical patients are discussed.

Operational Definition of Process Quality

The concept of the quality of the surgical process includes many factors which may be summarized into three major categories: accuracy of services, appropriateness of services, and documentation of treatment. The approach to the evaluation of process quality used in this study, however, did not address all of these issues. For the purposes of this evaluation, the quality of surgical process was defined as the appropriateness of the characteristics of the patient treatment during the surgical episode, exclusive of the actual surgical technique employed by the physician to perform the operation. The attributes of the process included, in addition to treatment characteristics, the background demographic and medical characteristics of the patient and their relationship to the selection and appropriateness of the surgical setting and the risk factors that were a function of the patients' characteristics and the surgical procedure.

To facilitate the study of differences in the treatment of surgical patients, the surgical episode was considered to consist of five phases: Screening, Preoperative, Operative, Post-Operative, and Recuperative. These phases provided the framework for the assessment of process quality. The operational definition of each phase is included in the methodological appendix.

Tasks Performed Within and Outside of the Facility as a Function of the Surgical Setting

The four surgical setings included in the evaluation constitute organizationally different approaches to the provision of surgical care. The responsibility for several of the activities during a surgical episode varied by type of surgical setting. For example, in the hospital inpatient setting as well as in the traditional hospital outpatient setting, the hospital had the responsibility for laboratory tests, radiology exams, and pathology services as an integral part of the facility in which the surgery was performed. In the HAASC setting, the surgical center delegated the responsibility for laboratory services to the hospital laboratory which was not organizationally or physically part of the ambulatory surgical center. The hospital affiliated surgical center was essentially sharing resources with inpatient institutions to perform a specific function. In the FSASC, only a limited number of laboratory services were performed by the surgical center itself as part of the patient care process provided by the facility. The physician had the responsibility for selecting and scheduling other tests through either a hospital or an independent laboratory. Unlike the inpatient setting, the FSASC does not maintain its own pathology laboratory and contracts out all pathology services. The FSASC has limited diagnostic radiology capability and provided radiology services only if requested. Any extensive work must be done outside the FSASC under special arrangement; whereas in the hospital-based surgical setting the main institution could generally provide all services requested by the physician. The availability of specific services by surgical setting and the arrangements for their use was discussed in the structural quality assessment.

The Screening Process--Alternative Approaches

The screening process is the activity undertaken by the surgeon and the anesthesiologist that results in the selection of the appropriate setting for the proposed surgery. Different approaches may be utilized to accomplish the screening based on the role of the surgical setting in the selection process. Through the mechanism of admission and concurrent review and the policy requirement for laboratory tests to be performed on all patients prior to surgery, the inpatient facility plays a significant role in screening activity. Physicians are required to justify the admission of patients to an inpatient facility and although the process is, in many cases, more of a formality, the medical record must reflect the need for hospitalization for the surgical procedure. The findings of the laboratory tests and the anesthesiologist's preoperative workup and physician examination assist the anesthesiologist and the surgeon in making the final determination of whether or not the surgery should be performed.

In all ambulatory settings, the screening process is considerably less formal. There is not the requirement to justify the admission for surgery and the outpatient records are not subject to the scrutiny that the inpatient records are. In the OP, HAASC, and FSASC surgical settings, the physician had the primary responsibility for determining whether or not the ambulatory setting is or is not appropriate for the type of surgery under consideration. The anesthesiologist's examination of the patient determines whether the level of anesthetic risk is acceptable for the ambulatory setting.

Description of Patient Flow in the Surgical Episode by Phase

In this section the general process of a surgical episode is described and the differences in the process between alternative surgical settings are identified. This general description of the patient flow by surgical setting serves as a guide for relating the specific treatment characteristics described later in this chapter to the phases of the surgical episode.

Screening Phase. The surgical episode is generally initiated in one of three ways for the twelve procedures included in the study. As a result of symptoms related to the problem requiring surgery or during a provider encounter for another reason:

- Patient seeks advice from family physician
- Patient contacts a specialist who performs the type of surgery indicated
- Patient seeks help directly from an institutional provider such as a hospital, outpatient clinic, or emergency room service.

The process of identifying the problem that results in the surgery appeared to vary with the nature of the problem. Three of the twelve procedures, vasectomy, laparoscopy with BTC, and augmentation mammoplasty are elective procedures in that they are performed at the option of the patient and the health status and medical consequences of not having the procedures are minimal (except in the case of a laparoscopy with BTC performed because of preexisting conditions.) For the other nine procedures the conditions and diagnoses are relatively specific. However, for the myringotomy with adenoidectomy and tonsillectomy and adenoidectomy procedures, the conditions may be treated medically for some period of time prior to the decision for surgery or the referral to a surgeon.

If the patient has sought help from a general or family practice physician, the physician may decide to treat the problem medically, or to perform the surgery himself, or to refer the patient to an appropriate surgical specialist. In the OP, HAASC, and FSASC settings, general and family practioners have surgical privileges, however over 90% of all procedures are performed by specialists. If a referral is made, the patient undergoes a second examination by the surgeon who determines the need for, and appropriateness of, the surgery. As a part of this determination and diagnosis, the surgeon may order specific laboratory tests and radiology examinations. However, based on discussions with physicians and patients it appears that the specific and relatively minor nature of the problems involving the twelve procedures included in the study generally do not require laboratory or radiology work by the physician independent of the work done by the surgical facility in preparation for the surgery. Once the specific surgical procedure is selected and the physician, in conjunction with the patient in some cases, decides the appropriate surgical setting, the physician's office schedules the time of surgery with the surgical facility. The patient is contacted by the surgical facility or the physician's office with information regarding admission procedures and scheduling, insurance requirements and food intake limitations prior to admission. For the inpatient surgical setting, the patient is contacted either by telephone or, in the case of one facility, personally by a patient services representative who explains what the patient may expect during and after admission and surgery. The outpatient setting has the least amount of patient contact in the screening phase with generally only telephone instructions - mostly provided by the physician rather than the facility. For some facilities, the patient is requested to report to the laboratory prior to the day of surgery for tests. However, this is not a consistent policy. In the two HAASC settings, the screening phase procedures were observed to differ somewhat. For one HAASC, the facility requires the patient to report to the hospital laboratory no earlier than 48 hours prior to the scheduled surgery for laboratory work. The hospital laboratory is open 24 hours a day, 7 days a week. It is the physician's responsibility to tell the patient of the laboratory requirement. For this HAASC setting the laboratory work required of all patients is a complete blood count and a urinalysis which takes less than thirty minutes of patient time at the laboratory. No radiology work is required. The HAASC received the written lab results the day before the scheduled surgery. The results are reviewed by the head nurse at the HAASC and filed in the patient's medical record. A nurse's auxilliary calls the patient the day before the surgery to confirm the time schedule and to see if the physician or the patient has decided to cancel the procedure. No insurance check is made on the patient by the facility. The physician is responsible for all medical instructions given prior to admission to the facility.

The other HAASC included in the study did not require a patient visit to the surgical center or to the main hospital prior to the day of surgery. The physician, when the procedure is scheduled, gives the admitting clerk the patient's name, address, and telephone number. A telephone call is made to the patient a few days prior to the scheduled surgery to verify the patient's insurance, if any, and the expected out-of-pocket payment required by the patient for the surgery. If the scheduling of the surgery permits, the HAASC mails to the patient at least two days in advance instructions regarding preparation for surgery and general information on the surgical center.

Similarly, the FSASC does not require a visit to the facility prior to surgery. When the surgeon schedules the surgery with the FSASC, the patient is sent a set of instructions by the facility concerning preparation for the surgery. These instructions include:

- What to wear
- What to eat or drink prior to admission
- What consent is required
- Under what conditions that patient will be discharged

The patient is instructed to arrive at the facility at least one hour prior to the scheduled time of the procedure.

When asked whether or not the patient recalled receiving specific instructions from the physician or from the facility regarding surgery, almost ninety percent of the patients reported receiving some form of instructions or preparation for the surgery. However, the settings varied somewhat. Exhibit IV-16 shows the patient recall of receiving instructions by surgical setting. As can be seen from the percent distribution, almost all of the patients who had surgery in the FSASC or HAASC settings and 82.4% of the OP setting patients recalled receiving pre-operative instructions. However, only 49.1% of the IP setting patients recalled receiving instructions This finding is not unexpected, however, because the patient's preparation prior to admission for a surgery scheduled for the inpatient setting is less critical. Whereas, the general instructions to ambulatory patients require avoiding food and liquids for 12 hours prior to surgery to reduce the anesthetic risk, the inpatient is under the control of the facility for at least 12 hours prior to surgery and the intake of food and liquids can be carefully controlled.

The total number of visits to a provider of care (e.g., physician, clinic, hospital, etc.) made by patients included in the patient interview sample during the screening phase by the

Exhibit IV-16

Patient Recall of Receiving Pre-Operative Instructions, by Surgical Setting

Surgical Setting / Response	Inpatient		Outpatient		HAASC		FSASC		Total	
	N	%	N	%	N	%	N	%	N	%
Received Instructions	28	49.1	28	82.4	211	94.6	254	94.1	521	89.2
Did Not Receive Instructions	27	47.4	6	17.6	9	4.0	15	5.6	57	9.8
Don't Know	2	3.5	0	0.0	3	1.4	1	.3	6	1.0
Total	57	100.0%	34	100.0%	223	100.0%	270	100.0%	584	100.0%

Source: Patient Interviews

surgical setting in which the surgery was performed is given in Exhibit IV-17 . It can be seen that the frequency of screening phase visits was lower in the FSASC setting than in the other three settings. Almost two-thirds of the FSASC setting patients had only one visit to a provider prior to admission for surgery. This contrasts with 63.2% of the patients from the IP setting who had two or more visits. The number of visits made by patients in the OP and HAASC settings showed a smaller proportion of patients who had only one visit to a provider than the FSASC setting. Fifty-six percent of the OP setting patients and 47.1% of the HAASC patients made only one provider visit prior to surgery.

Exhibit IV-18 shows the distribution by setting of visits made to a physician's office during the screening phase (excludes visits to other providers in non-office locations). Again the FSASC had the highest proportion of single office visit episodes (72.2%) and the inpatient setting had the lowest with 42.1%. The outpatient and HAASC settings had similar proportions of single office visit episodes with about two-thirds of the cases in the one visit category. Interestingly, 11.8% of outpatients reported no doctor's office visit prior to admission for surgery. In interpreting these data, it should be kept in mind that the number of outpatient responses is very small and any inferences should be drawn with care.

Although no direct observations of patients were made in the physicians office setting, in-depth discussions were held with fifteen Maricopa County physicians with respect to five procedures included in the study that were found to be performed in the physicians office surgical setting and myringotomy with or without tubes. For the screening phase, all six of the procedures (myringotomy with or without tubes, dilation and curettage, circumcision, vasectomy, augmentation mammoplasty, and excision of lipoma or sebaceous cyst) generally required one visit to the physicians office for the purpose of examining the patient's condition, discussing the surgery, and scheduling a convenient time for the procedure. Typically, the office visit required one-half hour of patient time with the physician spending from fifteen to forty five minutes on the case. A medical history was taken and physical examination was generally performed. For myringotomy patients all three of the physicians with whom the procedure was discussed indicated they attempted to first treat the condition medically prior to the surgery unless

Exhibit IV-17

Total Number of Provider Visits In Screening Phase, by Surgical Setting

Number of Visits \ Surgical Setting	Inpatient		Outpatient		HAASC		FSASC		Total	
	N	%	N	%	N	%	N	%	N	%
0	1	1.8	0	0.0	1	0.4	9	3.3	11	1.9
1	21	36.8	19	55.9	105	47.1	177	65.6	372	55.1
2	23	40.4	7	20.6	86	38.6	54	20.0	170	29.1
3	8	14.0	4	11.8	16	7.2	19	7.0	47	8.0
4 or more	4	7.0	4	11.8	15	6.5	11	4.1	34	5.9
Total	57	100.0%	34	100.0%	223	99.8%	270	100.0%	584	100.0%

Source: Patient Interviews

Exhibit IV-18

Number of Doctor's Office Visits in Screening Phase by Surgical Setting

Surgical Setting / Number of Visits	Inpatient		Outpatient		HAASC		FSASC		Total	
	N	%	N	%	N	%	N	%	N	%
0	2	3.5	4	11.8	4	1.8	10	3.7	20	3.4
1	24	42.1	21	61.8	149	66.8	195	72.2	389	66.6
2	24	4.1	3	8.8	56	25.1	45	16.7	128	21.9
3	5	8.8	5	14.7	6	2.7	12	4.4	28	4.8
4 or more	2	3.5	1	2.9	8	3.6	8	3.0	19	3.3
Total	57	100.0%	34	100.9%	223	100.0%	270	100.0%	584	100.0%

Source: Patient Interviews

immediate surgery was required to prevent a rupture of the tympanic membrane. For dilation and curettage patients the screening visit includes a brief pelvic examination to determine the need for the procedure and the appropriateness of the office setting for the surgery. The screening visit to the physician for a vasectomy and an augmentation mammoplasty was primarily a counseling session where the risks of the procedure were explained to the patient. If the patient decides to undergo the procedure the surgery is scheduled for one to two weeks to allow the patient a "cooling off" period to reconsider the decision.

For the excision of lipoma or sebaceous cyst procedure a brief examination of the operative site was made in the screening phase and the surgery was scheduled for one day to one week after this first appointment.

Only one of the fifteen physicians with whom the six procedures were discussed reported requiring a clinical laboratory test on a patient scheduled for surgery in the office. This was a urinalysis (dipstick) for vasectomy patients treated by the physician. No radiology examinations were stated as required by the physicians.

Preoperative Phase. The preoperative phase is initiated with the patient's admission to the facility in which the surgery is to be performed. In the case of the inpatient setting, the patient is generally admitted between 1 p.m. and 4 p.m. of the day before the scheduled day of surgery. In the outpatient, HAASC, and FSASC settings, the patient is generally requested to arrive at the facility at least one hour prior to the scheduled time of surgery. As expected, the admission procedure is more complex for the inpatient setting than for the ambulatory settings. In all of the ambulatory settings, the medical record, an insurance assignment form, and the consent forms for anesthesia and surgery comprise the set of admitting documentation. Forms are generally partially completed in advance of the patient's arrival so as to speed the admitting process.

For the settings and facilities where laboratory tests and/or radiological exams are completed before the day of surgery, no other activity is required before the patient is taken to the preoperative holding area. In the inpatient setting, the patient is typically sent to the laboratory and to radiology prior to being transferred to the nursing ward. In the outpatient setting, any physician-requested lab work not completed prior to the day of surgery is done immediately after admission whereupon the patient is taken to the preoperative holding area. In most outpatient facilities this is a small space located adjacent to the emergency room or outpatient surgery area. In many cases, outpatients scheduled for surgery are admitted through the emergency room department.

In the HAASC that does not require a screening phase laboratory visit, all laboratory work and radiological work (only if requested by the physician in the latter case) is performed immediately after admission to the ambulatory surgical center and the completion of the lab work authorization form.[10] The laboratory is physically located in the same structure as the center and is easily accessible to the patient. Laboratory work-up for the HAASC consists of four tests: Hematocrit, White Blood Cell Count, Rapid Plasma Reagent, and a Dipstick Urinalysis. The dipstick used for the urinalysis is of the multitest type and includes the following specific tests:

- Ketones
- Blood
- Protein
- Glucose
- Ph
- Bile
- Nitrates
- Urobilinogen

The lab work is performed by a laboratory technician and the results are sent back to the HAASC immediately. The patient then returns to the HAASC admitting desk for further instructions. If any test is found to be abnormal the surgeon can order additional or repetitive tests. The patient is taken to a pre-operative changing area by an RN where the RN takes a brief medical history with particular emphasis on allergies and medications. In the other HAASC included in the study, an auxilliary takes the patient to the holding area where an RN does the basic preoperative workup.

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[10] Overall, 8.3% of patients had chest X-rays, 62.1% of IP patients, 7.7% of OP, 0.7% of HAASC, and 0.2% of FSASC. Other X-rays were ordered in only 7 cases (out of 882) across all settings.

Laboratory work at the FSASC is performed after the patient has been taken by an RN to a small waiting room in the preoperative area. Two tests are performed: Hemoglobin, and Dipstick Urinalysis. The urinalysis consists of the following tests:

- Ketones
- Blood
- Protein
- Glucose
- Ph
- Albumin
- Bilirubin

In the ambulatory settings the patient is placed on a transport in the preoperative holding area where an RN begins the workup which includes the checking and recording of blood pressure, temperature, pulse, and respiration. In the inpatient setting, this workup is performed on the nursing ward after which the patient is premedicated and moved on a transport to the operating room suite by an orderly.

In the HAASCs and the FSASCs the patient is seen in the preoperative holding area by an anesthesiologist and the medical history is reviewed and the heart and lungs are checked using a stethoscope. In the outpatient setting, the preliminary preoperative examination is given by an RN or, depending on the institution, a resident or intern. In all settings, an anesthesiologist is responsible for the examination of heart and lungs.

In the FSASC, patients are generally premedicated in the preoperative phase. One HAASC does not premedicate except for some procedures done under local anesthetic such as plastic procedures or if the patient is to be intubated. In the later case, atropine is used as premedication. In the other HAASC, premedication in the preoperative phase is standard using demerol, vistaril, and atropine. In none of the ambulatory surgical centers is an I.V. given as standard practice as it is in most of the inpatient facilities. In one HAASC, the patient is prepared for an I.V. with a butterfly needle so that the I.V. may be administered without delay if necessary. In this setting an IV is generally administered for patients undergoing tonsillectomy and adenoidectomy, or dilation and curettage (if bleeding).

When the operating room and surgeon are ready, the patient is moved from the preoperative area to the O.R. suite. It should be noted that in the ambulatory surgical centers the transfer is completed without delay because the doors to the OR suite are adjacent to the preoperative holding areas. For the inpatients, however, the transfer requires moving the patient from the nursing ward to the operating suite which in many facilities is on a different floor of the hospital or located in a different wing.

For procedures performed in the physician's office, the pre-operative phase activities were generally minimal according to the fifteen physicians with whom the procedures were discussed. Activities in the preoperative phase included taking the patient's vital signs, laying out the surgical tray and preparing the operation room for the procedure. No laboratory tests were performed prior to surgery. If appropriate the surgical site was scrubbed and shaved by a nurse or a technician. Some physicians reported that the patient was generally premedicated. One physician who performed dilation and curettage in his office (which included a full surgical suite) under general anesthesia, premedicated with atropine. Two of the five physicians who performed vasectomies used demerol or morphine sulfate as premedication, and one of the two physicians who performed augmentation mammoplasty premedicated with nembutal, demeral, and volume via in conjunction with an I.V. solution. Only one of the twelve physicians who performed excision of lipoma or sebaceous cyst reported premedicating the patient prior to surgery.

As soon as the very brief preoperative phase was completed the patient was taken to the operating room in the physicians office. However, for several physicians the patient was taken directly to the operating room and only preoperative activities were performed there.

Operative Phase. The operative phase begins when the patient enters the operating room suite. For all surgical settings the activities and patient flow are very similar with only minor differences in patient care patterns.

In the inpatient and hospital outpatient surgical settings a continuous EKG is generally taken. In one HAASC, the continuous EKG is also provided whereas in the other HAASC a continuous EKG is at the discretion of the anesthesiologist. At the FSASC setting, a cardiac monitor is available for use at the discretion of the surgeon or the anesthesiologist. In all settings blood pressure is monitored by a blood pressure cuff. After the patient is transferred from the transport to the operating table, the anesthesiologist, if the procedure is to be done under a general anesthetic, begins the anesthesic administration. In most cases if the procedure is to be performed under a local anesthetic, the surgeon is responsible for infiltrating the anesthetic. After the patient is sufficiently anesthetized the surgical procedure is begun and, if appropriate, tissue is removed. If suspect, a frozen section is made and the tissue sent to the pathology laboratory for an immediate report. The surgery is completed and the anesthesia is terminated. In all surgical settings the patient is moved from the operating room directly to the recovery area. In a very few instances with local anesthesia the patient may bypass the recovery room and go directly to the waiting room of the facility. However, in most cases, the anesthesiologist and an RN moves the patient on a transport to the post-operative area.

In the physician's office surgical setting the patient flow was apparently very similar to the patient flow in the FSASC and HAASC settings. The duration of the procedures are relatively short in that most are performed under a local anesthetic. However, one physician performed dilation and curettage under a general anesthetic administered by an anesthesiologist in the office setting. Augmentation mammoplasty is also a relatively lengthy procedure and one physician performed it using intercostal nerve block in conjunction with a local anesthetic.

For most surgical procedures performed in the physician's office, patients rested briefly in the operating room and then dressed and were sent home with no post-operative or recovery room phase. However, for two procedures, dilation and curettage (under general anesthetic) and augmentation mammoplasty, the patient was moved from the operating room to a separate recovery room area set aside in the physician's office.

Post-Operative Phase. The post-operative phase is the period of time spent by the patient in the recovery room before being transferred to a nursing ward in the case of the inpatient setting or discharged from the facility in the case of the ambulatory settings. Upon transfer of the patient from the operating room, the anesthesiologist gives a verbal report of the patient's status and transfers the patients record to the recovery room nurse. In all settings the patient's respiration, blood pressure and pulse are immediately checked by the recovery room nurse. In the FSASC setting and in one HAASC the recovery room nursing staff takes over the principal patient monitoring functions from the anesthesiologist very soon after the patient arrives in the recovery room. In the other HAASC included the study the anesthesiologist generally stays with the patient in the recovery room until the patient is awake. In the inpatient and outpatient settings the recovery room staff which, includes RN, LPN, and aides supervised by an anesthesiologist, provides the patient care. In each of the surgical settings the recovery room staff attempts to get the patient to respond as rapidly as possible by talking to the patient and encouraging the patient to take deep breaths. In the ambulatory settings, the patient is discouraged from sleeping and encouraged to ingest fluids and exercise motor skills. The patient's vital signs, particularly blood pressure, are monitored regularly. Less emphasis is placed on immediate wakefulness in the inpatient setting. Also, unlike the ambulatory setting where the patient must be fully conscious before discharge is approved, patients in the inpatient setting are transferred from the recovery room back to the nursing ward before having regained consciousness but showing stable vital signs. Consequently, the time spent in the post-operative phase by inpatients tends to be shorter than the time spent by ambulatory surgery patients. For some patients who exhibited severe pain and nausea, post-operative medication may be administered. Across settings, the medication administered in the post-operative phase is either demerol, empirin, thorazine or torecan. The surgical settings are very similar in the responsibility for transferring or discharging a patient from the recovery room. In all settings, with the exception of an HAASC, the supervising anesthesiologist has the discharge responsibility for the patient. In one HAASC, the surgeon may discharge the patient from the facility.[11] The same HAASC requires a minimum of two hours time in the recovery room for the patient. None of the ambulatory settings included in the study use any specific objective test of motor coordination or functional status. Rather, the discharge decision is based on the observation of the anesthesiologist and recovery room nursing staff. The FSASC uses the following criteria in arriving at a discharge decision:

- Stable vital signs for at least one hour
- No physical indications of potential complications
- Cessation of oozing or bleeding
- Absence of nausea and emesis or evidence of their waning
- Where tourniquets are required, return of sensation and adequate circulation
- Recognition of time and place
- Little or absent dizziness
- Controllable pain

All ambulatory settings included in the study required the patient to be discharged in the company of an adult. In some cases, although a patient had the surgery on an ambulatory basis, the patient was transferred as a "post-op admit "to the inpatient setting or to a convalescent care facility. In one HAASC patients having tonsillectomy and adenoidectomy were routinely transferred to the main hospital for overnight observation. For augmentation mammoplasty procedures, patients from the FSASC and one HAASC were transferred, generally by ambulance, to a convalescent care facility for a full or partial day of observation.

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[11] This can take place where a surgeon is performing multiple procedures (on different patients) on the same day, and thus is present in the facility as the first patients are recuperating.

For most procedures performed in the physicians office setting the patient was released directly from the operating room to home after the surgery. According to the physician who performed dilation and curettage under general anesthetic in the office setting, however, the patient spends approximately one hour in the recovery room in the office prior to discharge to let the anesthetic wear off. The patient is continually monitored by an RN and checked occasionally by the physician who finally releases the patient. Both physicians who performed the augmentation mammoplasty procedure reported keeping the patient in the office recovery room for one-half hour where an RN checked on the status of the patient at intervals. For this procedure the patients were transfered by ambulance from the physician's office recovery room for an overnight stay in the Medicenter -- a convalescent care facility.

Recuperative Phase. The recuperative phase begins with the patient's release from the recovery room area and is defined as ending when the patient returns to normal activity. For the inpatient setting or in the case of a post-operative admit from an ambulatory setting, part of the recuperative phase takes place in the hospital. When a patient is discharged from the recovery room or ambulatory setting and admitted to a convalescent facility for a period of rest or observation following surgery, then part of the recuperative phase takes place in a non-acute care institutional setting. The large majority of all patients in each of the four settings were discharged to home. Of the patients interviewed, 91.9% of the FSASC patients, 88.4% of the HAASC patients and 85.3% of the outpatients went from the surgical facility to home. Reflecting the post-operative admit policies of one of the HAASCs for tonsillectomy and adenoidectomy, 4.9% of the HAASC setting patients were admitted to the inpatient hospital from the surgical center. One of the outpatients interviewed also was admitted. Three patients from the FSASC representing 0.7% of the patients interviewed from that setting made unplanned transfers from the surgical center to an acute care hospital after surgery. These special cases are discussed in detail in the outcome quality assessment part of this chapter. Only two patients were discharged to a long term care institution which was their regular place of residence.

A significant percentage of patients who had surgery in the ambulatory settings were discharged to convalescent or convalescent-type facilities for short term observation. Almost twelve percent of the outpatients were in that category as were 6.7% and 6.6% of the HAASC and FSASC setting patients respectively. As discussed in the outcome quality section, these transferred patients are patients having augmentation mammoplasty or other procedures where some minimum level of professional care may be appropriate but an inpatient admission may not be warranted.

All three of the ambulatory surgical centers included in the study used a telephone follow-up call to the patient the day after the surgery to check the status of the patient. In the FSASC and one HAASC the follow-up calls are made by the recovery room nurse. In the other HAASC an auxilliary is responsible for the calls. Specifically, the calls are made to determine: any problems encountered at home; whether the patient was able to sleep the previous night; how the patient feels now; and whether or when the patient has resumed normal activity. Relevant information is noted in the operating room log book and/or the medical record. If a problem is identified, the patient will be referred to the surgeon for instructions. There was no evidence that similar follow-up calls were made from the outpatient surgical setting or the inpatient setting for the facilities included in the study.

During the recuperation phase, the patient generally makes one or more follow-up visits so that the progress of the recovery can be monitored. Exhibit IV-19 shows the frequency of patients' visits to providers in the recuperation phase by surgical setting.

As may be seen from the distribution, a larger porportion of patients having surgery in the OP setting had no follow-up visits to a provider after the surgery (26.5%) than did patients in any of the other three settings. The FSASC and HAASC settings experienced approximately the same proportion of patients with only one follow-up visit (40.7% for FSASC and 43.0% for HAASC). The IP setting patients generally experienced more visits to a provider in the recuperative phase than patients in any of the other surgical settings.

Exhibit IV-19

Total Number of Provider Visits in Recuperative Phase by Surgical Setting

Number of Visits \ Surgical Setting	Inpatient		Outpatient		HAASC		FSASC		Total	
	N	%	N	%	N	%	N	%	N	%
0	5	8.8	9	26.5	10	4.5	22	8.1	46	7.9
1	19	33.3	11	32.4	96	43.0	110	40.7	236	40.4
2	17	29.8	7	20.6	57	25.6	53	19.6	134	22.9
3	7	12.3	2	5.9	28	12.6	33	12.2	70	12.0
4 or more	9	15.8	5	14.6	32	14.3	52	19.4	98	16.8
Total	57	100.0%	34	100.0%	223	100.0%	270	100.0%	584	100.0%

Source: Patient Interviews

The distribution of doctors office visits is given in Exhibit IV-20. Again the HAASC and FSASC setting patients showed approximately the same distribution with a somewhat larger proportion of FSASC patients in the four or more visit category (15.8% for FSASC and 11.2% for HAASC). Over one-third of the OP setting patients reported that they did not have a followup doctor office visit after surgery.

Based on the interviews with 15 physicians, it appears that the recuperative phase followed essentially the same course as for patients treated in the other ambulatory settings. For myringtomy patients the recuperation period was one day with one office visit after a week to remove the implanted tubes. Patients having a dilation and curettage generally experienced a recuperation period of two days or less according to the two physicians who performed this procedure. One physician reported a single follow-up office visit as routine while the other physician (who performed the procedures under general anesthesia) normally made two telephone contacts and the required one office visit in about 80% of the cases.

The one physician who performed circumcisions in the office on patients over 18 years of age reported a one week period of light activity and two follow-up visits -- at three days and one week after the surgery.

Vasectomy patients treated in the office setting according to physicians generally experienced restricted activity for three days to one week after surgery with generally one day of complete rest. Two semen analyses were recommended at six weeks and at six months after surgery. Sutures were removed generally one week after the procedure.

Both physicians who performed the augmentation mammoplasty procedure in the office setting reported a recuperative period of approximately eight weeks for most patients. One physician required a series of four office visits--at three days, one week, two weeks, and three weeks. The second physician normally included three follow-up visits at one week, one month, and three months.

Exhibit IV-20

Number of Doctor's Office Visits in Recuperative Phase, by Surgical Setting

Surgical Setting	Inpatient		Outpatient		HAASC		FSASC		Total	
	N	%	N	%	N	%	N	%	N	%
0	7	12.3	12	35.3	12	5.4	25	9.3	56	9.6
1	26	45.6	9	26.5	112	50.2	116	43.0	263	45.0
2	10	17.5	8	23.5	51	22.9	62	23.0	131	22.4
3	7	12.3	0	0.0	23	10.3	24	8.9	54	9.2
4 or more	7	12.3	5	14.7	25	11.2	43	15.8	80	13.8
Total	57	100.0%	34	100.0%	223	100.0%	270	100.0%	584	100.0%

Source: Patient Interviews

The excision of lipoma or sebaceous cyst procedure generally required only one day recuperation according to the twelve physicians with whom the procedure was discussed. Ten of the twelve physicians required only one follow up visit by the patient within five to seven days after the surgery, one reported no required follow-up visits, and one physician reported two follow-up visits in the normal recuperative period--one after four days and one after three weeks.

The recuperation phase was considered completed when the patient returns to routine daily activity. However, it should be noted that for some surgical procedures such as advancement or recession of eye muscle, the patient may remain under the doctor's care for an extended period of time and have additional surgery to further correct the problem. It was difficult in these cases to identify a logical end of the surgical episode for a single operation.

Summary of Findings. This section summarizes the major findings on patient flow patterns. Since much of the detail of this section is presented as a guide to the interpretation of the section that follows, and since much of the substance of the patient flow is quite evident from the basic nature of each setting, only the major differences between settings are presented as findings. These are as follows:

- The FSASC setting appears to place the fewest demands on the patient for amount of time and number of interactions with the facility prior to admission for surgery and during the pre-operative phase. Whereas one HAASC requires a visit to the main hospital for laboratory work prior to the day of surgery and the OP and IP setting also require the patient's interaction with the hospital laboratory departments and, in some cases, the radiology departments, the FSASC provides minimal laboratory services within the facility adjacent to the preoperative holding area.

- The HAASCs differed in their approach to scheduling laboratory work for minor surgery patients. One HAASC required the patient to report to the main hospital laboratory within 48 hours of the scheduled day of the surgery. The other HAASC performed the lab work in an outpatient laboratory after the patient was admitted.

- Nearly all FSASC and HAASC patients (94.1% and 94.6%) and most OP patients (82.4%) recall having received preoperative instructions, but only 49.1% of IP patients could recall this. However, this was not unexpected, since the facility can exercise a greater degree of control over a patient in the IP setting.

- Patients interviewed after a surgery reported different numbers of provider visits during the screening phase. FSASC patients had the fewest provider visits with about two thirds having only one visit. Approximately 37% of the IP setting patients had only one visit.

- In the FSASC, patients are generally not premedicated in the preoperative phase, while this is done for some procedures (e.g., plastic surgery) at one HAASC and for nearly all procedures at the other HAASC and in the IP and OP facilities.

- In the post-operative phase, more emphasis was apparently placed on immediate wakefulness and the exercise of motor skills in the ambulatory settings than in the IP setting.

- All the facilities except for one HAASC place the responsibility for discharge on the supervising anesthesiologist. The one HAASC may place this responsibility upon the surgeon.

- All of the ambulatory settings required patients to be discharged in the company of an adult. In some individual cases and for some procedures, patients that had surgery on an ambulatory basis were transferred as a "post-op admit" to an inpatient facility (in the case of an HAASC) or to a convalescent care facility for observation.

- Across all settings, 85% or more of the patients were discharged to their homes. Reflecting post-up admits, 4.7% of the HAASC patients were admitted to the inpatient institutions, but only one OP and two HAASC patients were admitted to inpatient institutions.

- The FSASC and HAASC settings made follow-up telephone calls the day after surgery to inquire about the patient's condition, while there was no regular practice to do this in the IP and OP setting.

- Forty percent of the FSASC setting patients and 43% of the HAASC patients had one follow-up visit to a provider during the recuperative phase as compared with 33.3% of the IP and 32.4% of OP setting patients. Whereas the IP patients generally had two or more follow-up visits, 26.5% of the OP setting patients reported no follow-up visit to a provider after surgery.

Patient Characteristics By Surgical Setting

In this section, the basic demographic and medical characteristics upon admission of the 882 patients included in the medical record abstract sample are described. The demographic and medical characteristics provide the basis of a limited analysis of potential patient risk for surgery and anesthesia. In some characteristics, the analysis was performed for all 12 specific procedures aggregated; however, for others a procedure-specific approach was used.

Demographic Characteristics. The distribution of patients by surgical setting is given describing each of the characteristics of age, sex, race, and area of residence for the patients included in the study. For area of residence and sex, little variation in patient characteristics was noted. However, for the other variables some interesting patterns were observed.

Patient Age - For several of the procedures the mean patient age was markedly greater for procedures performed in the IP setting than in the ambulatory settings. For excision of breast mass, for example, Exhibit IV-21 shows the average age to be 42.9 in IP, 29.0 in OP, 35.2 in HAASC, and 34.3 in FSASC. For dilation and curettage, the mean age was 50.5 in IP, 39.1 in OP, 41.5 in HAASC, and 41.1 in FSASC. These differences were significant ($p \leq .05$) except for breast mass excision in OP, where the number of observations was insufficient to calculate a significance test.

Exhibit IV-21

Mean Age of Patients for 12 Surgical Procedures, by Setting

Procedure	Setting											
	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
Myringotomy Procedure (with tubes) and Adenoidectomy	4.3	4.1	17	4.0	4.0	6	3.3	1.9	28	2.4	1.7	30
Tonsillectomy and Adenoidectomy	7.0	2.5	19	14.0	0.0	1	6.1	2.4	23	5.7	2.7	15
Dilation and Curettage	50.5	9.1	18	39.1	9.4	18	41.5	12.7	61	41.1	13.2	63
Laparoscopy with Tubal Coagulation	32.7	2.9	3	29.2	7.6	37	32.0	6.2	34	32.7	7.1	63
Excision of Breast Mass	42.9	10.4	14	29.0	11.3	2	35.2	11.3	33	34.3	10.7	35
Excision of Ganglion	31.7	15.3	3	20.5	2.1	2	32.5	15.8	27	30.4	13.7	39
Inguinal Herniorrhaphy	1.7	2.0	6	1.0	1.4	2	1.5	2.1	2	2.7	3.0	38
Vasectomy	-	-	-	-	-	-	30.5	4.8	6	34.6	7.9	42
Circumcision	24.0	17.0	2	-	-	-	40.7	8.5	3	42.8	12.9	12
Aumentation Mammoplasty	40.0	0.0	1	32.9	6.5	7	30.5	7.1	27	31.9	7.4	25
Eye Muscle Operation	7.9	7.6	17	6.0	0.0	1	4.5	3.8	25	6.5	8.4	27
Excision of Lipoma or Sebaceous Cyst	66.0	0.0	1	23.0	7.1	2	34.7	23.6	13	46.5	16.3	28
Total, all procedures	▨	▨	103	▨	▨	78	▨	▨	284	▨	▨	417

Source: Medical
Record Abstracts

From these observations it appears that for these two procedures, older, and perhaps higher risk patients were more likely to have surgery performed in IP setting than in ambulatory settings. One other aspect of the age distributions observed was that for most procedures there was very little difference in the mean age of patients in the HAASC and FSASC settings, indicating that, at least in terms of age, the patient populations apparently were similiar.

Race - Exhibit IV-22 shows the distribution by race of surgical patients for four surgical settings. As is shown, 91.0% of the patients in the sample were white, 6.4% Hispanic and 2.3% Black. The proportion of these two minority groups in the study sample was below the proportion in the Maricopa County population according to the U.S. Census, which reported 3.4% Black and 14.5% Hispanic for the county in 1970. Thus minority individuals appear to be underrepresented in the sample of patients undergoing surgical procedures at the facilities included in the study. Also, the OP setting had a substantially higher proportion of minority patients than did the other settings: 16.9% Hispanic and 12.7% Black, and 69.0% White. This is accounted for by one large facility, Maricopa County General Hospital, which provides medical and surgical services to the indigent and welfare populations in Maricopa County which are disproportionately made up of minority population groups. (It should be pointed out that during the period of this study, Arizona did not have a Medicaid program.) The HAASC and FSASC settings had the smallest proportion of their case loads made up of minority patients of the four surgical settings.

Sex - Exhibit IV-23 presents the distribution by sex of patients undergoing all procedures. As is shown, about 30% of the surgical patients were men and 70% were women. This proportion varied relatively little by setting, and such variation as there was may be explained by the greater prevalence of procedures performed exclusively on one sex in one or the other setting (e.g., greater prevalence of laparoscopy with BTC in the OP setting). In general, gynecological procedures were the most frequently performed group of procedures in ambulatory settings.

Exhibit IV-22

Race of Patients Undergoing 12
Surgical Procedures, by Setting

Racial Category	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
White	85.7%	69.0%	95.8%	93.6%	91.0	716
Hispanic	12.2	16.9	3.8	4.4	6.4	50
Black	2.0	12.7	0.0	1.7	2.3	18
Asian	0.0	0.0	0.0	0.2	.1	1
Other	0.0	1.4	.5	0.0	.2	2
Total, all categories	99.9% n = 98	100.0% n = 71	100.1% n = 213	99.9% n = 405	100.0%	n=787

Source: Medical
Record Abstracts

Exhibit IV-23

Sex of Patients Undergoing 12 Surgical Procedures, by Setting

	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Male	32.0%	11.7%	27.6%	34.8%	30.1	265
Female	68.0	88.3	72.4	65.2	69.9	615
Total	100.0% n = 103	100.0% n = 77	100.0% n = 283	100.0% n = 417	100.0%	n=880

Source: Medical
Record Abstracts

Area of Patient Residence - With respect to the area of residence of patients in the sample, 63.9% resided in Phoenix, 9.6% in Scottsdale, and 8.6% in Glendale, 4.3% in Tempe and 4.2% in Mesa. Three percent of the patients in the sample lived in other areas of Maricopa County and 6.0% of the patients lived in Arizona outside of Maricopa County. Four patients (0.5%) resided out of state. Little variation in residence was observed by surgical setting with the exception of Scottsdale. Across settings, 6.8% of IP patients resided in Scottsdale, 2.7% of OP, 16.9% of HAASC, and 6.5% of FSASC. This higher proportion of HAASC patients from the Scottsdale area may be accounted for by the presence of an HAASC at Scottsdale Memorial Hospital. It should also be noted that the IP and OP surgical settings had a significantly higher proportion of patients residing outside of Maricopa County then did either the HAASC or FSASC settings with 13.6% of the IP cases and 17.3% of the OP cases coming from outside the county compared with 2.8% and 4.3% for the HAASC and FSASC respectively.

Patient's Medical Characteristics Upon Admission. In this section the medical characteristics of patients included in the sample will be assessed as related to patient risk. The characteristics selected for analysis and abstracted from the medical record for each patient are:

- American Society of Anesthesiologists (ASA) Index
- White Blood Cell Count
- Systolic and Diastolic Blood Pressure
- Hemoglobin/Hemotocrit Level
- Preexisting Conditions
- Obesity
- Medications in Current Use
- Laboratory and Radiological Findings.

Each of these characteristics is discussed in the following sections.

ASA Physical Status Index - The ASA Physical Status Index is a summary assessment of a patient's physical status condition that reflects the risk of anesthesia. It is a judgement made by the anesthesiologist and noted on the medical record after the examination. An index value of one is a good risk for anesthetic, whereas a value of five indicates a very poor risk.

Of the 882 surgical patients in the sample, 687 were rated upon admission to the facility using the ASA index. Exhibit IV-24 shows the distibution of patients by ASA index value and surgical settings. As is shown, 78.9% of the IP patients are in category one, the lowest risk group, 72.5% of OP patients, 87.6% of HAASC patients, and 85.1% of FSASC patients. Thus, it seems evident from the data that a large proportion of patients who are accepted for the minor surgical procedures included in the sample are relatively good risks for the procedure; across all settings, 84.1% of patients are in this category. It also seems evident that HAASCs and the FSASC are accepting fewer patients than IPs and OPs in category 2 and almost no patients in categories 3 and 4. Only the inpatient setting had patients with a ASA physical status of four indicating a high risk patient. The difference in the proportions of category 1 patients accepted by each setting were tested for statistical significance using the Z test. The only differences between settings found to be significant with $p \leq .10$ were OP-HAASC ($p = .06$) and OP-FSASC ($p = .01$). It would appear that the OP setting is accepting patients of somewhat greater risk as measured by the ASA index than the other ambulatory settings.

It should be noted that of the 195 cases in which no ASA rating was obtained, more than half -- 107 -- were in the HAASC setting. These made up 37.7% of all HAASC patients. This was the result of one HAASC not recording the ASA rating index in the medical record for patients undergoing procedures. Further, the proportions of cases in which an ASA determination was made varied considerably by procedure. Among the twelve procedures performed at HAASCs, a determination of ASA physical status was made in 91.3% of the tonsillectomy and adenoidectomies and 100% of the eye muscle operations, but only 22.2% of the excision lipoma procedures. The large proportion of patients for whom only a local anesthetic was used in these latter two procedures probably accounted for the non report of the ASA index.

Exhibit IV-24

Distribution of Patients by ASA Physical Status Index Across Surgical Settings

ASA Physical Status	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
1	78.9%	72.5%	87.6%	85.1%	84.1	578
2	14.5	23.5	12.4	14.1	14.4	99
3	4.0	3.9	0.0	.8	1.1	8
4	2.6	0.0	0.0	0.0	.2	2
	n = 76	n = 51	n = 177	n = 383	100.0	687

Note: 195 responses were unknown or not recorded.

Source: Medical
Record Abstracts

White Blood Cell Count - Exhibit IV-25 shows the distribution of white blood cell count grouped into below normal, normal, and above normal by surgical settings. The white blood cell count is a measure of the level of bacterial infection in the body and the body's ability to combat disease. Standard ranges were used to establish the below and above normal groups.

As is shown, the proportion of normal values is 79.2% for IP, 75.0% for OP and 75.9% for HAASC patients. For FSASC patients, 57.1% were found to have normal readings; however WBC counts were taken for only seven patients in the FSASC setting. At the FSASC setting, WBC is taken only on the specific request of the physician when a problem is suspected. That WBC is performed only on an exception basis probably accounts for the below normal values for four of the seven cases. Nevertheless, the fact that the WBC values for the IP, OP, and HAASC setting show approximately the same distribution indicates that the white blood cell count did not differentiate patients among surgical settings and was apparently not a factor in screening patients for selection of an inpatient versus ambulatory surgical setting.

Blood Pressure - Exhibit IV-26 shows the proportion of surgical patients having elevated blood pressure levels at time of admission. Elevated blood pressure was defined separately for age- and sex-specific cohorts using standard ranges. As shown, relatively few patients in any of the settings had elevated blood presures, 1.1% for diastolic and 10.1% for systolic. Of these, however, fewer IP patients' blood pressure was above normal as compared to the other settings. This was particularly noticable for the systolic reading, where IP patients had 5.6% elevated, OP 12.2%, HAASC 10.1%, and FSASC 11.1%. This difference may be accounted for in that the IP patient's blood pressure was taken upon their admission to the facility, usually the day before the procedure was to be performed. OP, HAASC, and FSASC patients' blood pressures were also taken upon admission but this was generally within 60 to 90 minutes of the scheduled time for surgery. In these cases, a patient's blood pressure may be somewhat more likely to be elevated because of anxiety over impending surgery.

Exhibit IV-25

Distribution of Patients' White Blood Cell Count
Across Surgical Settings

White Blood Cell Count	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Below Normal	5.0%	2.3%	9.3%	42.9%	8.1	34
Normal	79.2	75.0	75.9	57.1	76.3	322
Above Normal	15.8	22.7	14.8	0.0	15.6	66
Total n for each setting, all procedures	n=101	n=44	n=270	n=7	100.0	422

Source: Medical
Record Abstracts

Exhibit IV-26

Proportion of Surgical Patients with Elevated Blood Pressure Across Surgical Settings

	Diastolic (>90 mm/Hg)				Systolic (>160mm/Hg)			
	Setting				Setting			
Procedure	IP	OP	HAASC	FSASC	IP	OP	HAASC	FSASC
Myringotomy Procedure (with tubes) and Adenoidectomy	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Tonsillectomy and Adenoidectomy	0	0	0	0	0	0	0	0
Dilation and Curettage	0	0	4.9	0	11.1	30.8	24.6	15.9
Laparoscopy with Tubal Coagulation	0	0	5.9	1.6	0.0	4.5	14.7	7.9
Excision of Breast Mass	0	0	0	0	7.1	0	3.0	5.7
Excision of Ganglion	0	0	0	0	0	0	7.4	5.1
Inguinal Herniorraphy	0	0	0	0	0	0	0	0
Vasectomy	0	0	0	0	0	0	16.7	9.5
Circumcision	0	0	0	0	0	0	0.0	33.3
Aumentation Mammoplasty	0	0	3.7	0	0	0	3.7	0
Eye Muscle Operation	0	0	0	0	0	0	0	0
Excision of Lipoma or Sebaceous Cyst	0	0	7.7	0	100.0	50.0	15.4	28.6
Total Proportion	0	0	2.6	0.3	5.6	12.0	10.1	11.1
Total n, each setting	90	50	267	316	90	50	267	316

Total elevated, diastolic = 1.1%
Total elevated, systolic =10.1%

Source: Medical
Record Abstracts

Hemoglobin/Hematocrit Levels - Exhibit IV-27 shows the proportion of surgical patients, by each procedure, whose combined hemoglobin and hematocrit levels were found, upon admission, to be below normal. Of the 845 patients for whom a determination was made, 156, or 18.5% were found to be below normal across all surgical settings.

Hemoglobin and hematocrit is a measure of the oxygen carrying capacity of the blood and is used as an indicator of anemia and general poor health. It should be noted that the hemoglobin and hematocrit levels in children fluctuate considerably and are thus not reliable measures of patient health for these patients for procedures such as myringotomy and tonsillectomy.

The data show that for all procedures performed in the IP setting, 36.3% had a below normal reading, compared to 25.4% in the OP setting, and 15.2% in both HAASC and FSASC. Using the Z test of statistical significance the only differences between settings found to be significant with $p \leq .10$ were IP-HAASC ($p = .03$) and IP-FSASC ($p = .02$).

Therefore, in contrasting inpatients with both HAASC and FSASC patients, the proportion of patients with below normal hemoglobin/hematocrit in the inpatient setting appeared to be significantly higher than the proportion of patients in HAASC and FSASC settings.

The meaning of these comparisons is that it appears that "weaker" patients, (i.e., those with a below normal hematocrit/hemoglobin level) were somewhat more likely to have surgery performed in the IP as compared to the other surgical settings. It should be understood, however, that these results may be caused in part by the over-representation of procedures performed on children in the IP setting. Examples are myringotomy and adenoidectomy, tonsillectomy and adenoidectomy, inguinal herniorrhaphy, and eye muscle operations, all of which were performed mainly on children and for which the differences between the IP and other settings seem most pronounced.

Exhibit IV-27

Proportion of Surgical Patients Whose Combined Hemoglobin and Hematocit Levels Were Below Normal Upon Admission, Across Surgical Settings

Procedure	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Myringotomy Procedure (with tubes) and Adenoidectomy	58.8%	33.3%	44.4%	23.3%	38.8	31
Tonsillectomy and Adenoidectomy	47.4	0.0	26.1	6.7	27.6	16
Dilation and Curettage	17.6	17.6	14.8	14.3	15.2	24
Laparoscopy with Tubal Coagulation	0.0	25.0	2.9	3.2	7.8	10
Excision of Breast Mass	21.4	0.0	7.1	11.4	11.5	9
Excision of Ganglion	0.0	50.0	4.3	10.3	9.0	6
Inguinal Herniorraphy	66.7	100.0	50.0	34.2	41.7	20
Vasectomy	0.0	0.0	0.0	26.2	22.9	11
Circumcision	0.0	0.0	0.0	16.7	11.8	2
Aumentation Mammoplasty	100.0	0.0	8.0	4.0	7.8	4
Eye Muscle Operation	35.3	0.0	24.0	25.9	27.1	19
Excision of Lipoma or Sebaceous Cyst	0.0	0.0	10.0	7.7	7.9	3
Total, all procedures	36.3% n = 37	25.4% n = 15	15.2% n = 41	15.2% n = 63	18.5%	156

Source: Medical
Record Abstracts

Pre-existing Conditions - In this section the pre-existing medical conditions recorded on the medical records for patients undergoing surgery in each of the four surgical settings is described. In examining these data, it was assumed that patients having these conditions present a generally higher risk profile as prospective surgical patients than patients that do not have these conditions. Therefore, patients with these conditions were considered more likely to be seen in the IP setting as compared to the OP, HAASC, or FSASC settings.

Exhibit IV-28 shows 13 pre-existing conditions reported for surgical patients, and the proportion of patients undergoing procedures in each setting who reported each condition. As is shown, the consistent patterns for most pre-existing conditions were for the proportion of patients in IP to be higher than that of the other settings. For example, 6.8% of the IP patients reported heart disease, as compared to 2.6% of the OP patients, 0.7% of the HAASC patients, and 3.4% of the FSASC patients. Thus, 6.8% of the IP patients reported heart disease, as compared with 2.3% of the non-IP (OP, HAASC, and FSASC combined) patients.

Of the thirteen pre-existing conditions, five were selected by inspection and a statistical test made of the significance of the differences between the IP and the non-IP values. The levels of significance obtained are shown in Exhibit IV-29. Only two conditions were found to be statistically significantly with $p \leq .10$ between the IP and combined ambulatory settings: heart disease ($p = .08$) and skeletal disorders ($p = .01$). The latter may be accounted for by the inclusion of a hospital specializing in the treatment of crippled children as an IP setting. It should be noted that although not statistically significant, none of the pre-existing conditions showed a pattern contrary to the expected, i.e., where the IP proportion is less than the ambulatory settings. Therefore, it may be inferred that IP setting surgical patients were somewhat more likely to have pre-existing medical conditions, particularly a heart condition, than were patients having surgery in ambulatory settings. Conversely, in terms of pre-existing conditions, patients having surgery performed in ambulatory settings tended to have lower risk profiles than patients in the IP setting.

Exhibit IV-28

Proportion of Surgical Patients in each of Four Surgical Settings Having Specified Pre-Existing Conditions

Pre-Existing Condition	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Heart Disease	6.8%	2.6%	0.7%	3.4%	2.8	25
Lung Disease	5.8	2.6	1.8	2.2	2.5	22
Liver Disease	0.0	1.3	1.1	2.4	1.6	14
Kidney Disease	2.9	0.0	1.1	1.0	1.1	10
Central Nervous System Disease	2.0	0.0	0.0	1.0	0.7	6
Diabetes	4.9	3.9	1.4	2.4	2.5	22
Bleeding Disorders	1.0	1.3	0.7	1.4	1.1	10
Allergies to Drugs	21.4	24.4	22.5	22.3	22.4	198
Allergies, General	13.6	5.2	6.7	11.3	9.6	84
Asthma	5.0	5.3	2.1	3.6	3.4	30
Endocrine Disorders	4.9	1.3	2.1	2.2	2.4	21
Major Skeletal Disorders	10.8	2.6	2.5	1.0	2.7	24
Previous Surgery	54.9	52.6	48.9	65.9	58.0	511
Total, all conditions	n=103	n=78	n=284	n=417		882

Source: Medical
Record Abstracts

Exhibit IV-29

Statistical Significance Across Settings of Differences in Selected Pre-Existing Conditions of Patients*

Pre-Existing Condition	% having each condition		Z value	Level of Significance
	Setting			
	IP	OP, HAASC, FSASC		
Heart Disease	6.8	2.3	1.77	.08
Lung Disease	5.8	2.0	1.61	.11
Kidney Disease	2.9	.9	1.19	.23
Endocrine Disorders	4.9	2.0	1.32	.19
Major Skeletal Disorders	10.8	1.6	2.96	.01

*Using Z distribution:

$$Z = \frac{P_1 - P_2}{\sqrt{\frac{P_1 q_1}{n_1} + \frac{P_1 q_2}{n_2}}}$$

Source: Previous Exhibit

Obesity - Exhibit IV-30 shows the weight group distribution by surgical setting for 550 patients for which height, weight, and age were recorded in the medical record. The FSASC apparently had the largest proportion of patients (61.3%) with weights within the normal range. Both the IP and OP settings were substantially below the FSASC and HAASC settings for the proportion of patients within the normal range. The HAASC and the FSASC had, respectively, 23.5% and 20.6% of their patients in the obese category, defined as a weight greater than 20% over the normal range. This compares with 35.9% for the IP setting. However, the OP setting had by far the greatest proportion of patients in the obese category of any of the surgical settings with 51.7%.

Medications in Current Use - This section describes the medications in use by surgical patients across each of the four surgical settings. Each of the medications reported was in use prior to the start of the surgical episode. As with the pre-existing conditions examined above, the presumption was that patients using these medications presented a somewhat greater surgical risk, and that they were, therefore, more likely to be seen in the IP setting as compared to the OP, HAASC, or FSASC settings.

Exhibit IV-31 shows the proportion of patients undergoing procedures in the four surgical settings who were using prior to their surgery one or more of the 17 medications shown. As with the above section, it seems clear that the IP setting included a distinctly higher proportion of patients using each of the medications. Further, it seems that there is no consistent pattern in the variation of the ambulatory proportions, and that in most cases there is relatively little difference among the OP, HAASC, and FSASC proportions. As an example of both of these tendencies, tranquilizers were used by 4.3% of the surgical patients in the overall sample, but by 8.7% of the IP patients and 3.7% of the ambulatory patients (3.8% OP, 3.5% HAASC, and 3.8% FSASC).

Eleven of the medications were selected by inspection and the differences between the IP proportion of prior use and the ambulatory setting proportion tested for statistical significance. These data are shown in Exhibit IV-32. Of the

Exhibit IV-30

Weight Group Distribution For Patients Over 20 Years, by Surgical Setting

Setting / Weight Group	Inpatient		Outpatient		HAASC		FSASC		Total	
	N	%	N	%	N	%	N	%	N	%
Normal Range	17	43.6%	13	44.8%	114	57.0%	173	61.3%	317	57.6%
Over Weight (10-19% Over Normal)	8	20.5	1	3.4	39	19.5	51	18.1	99	18.0
Obese (20% Over Normal)	14	35.9	15	51.7	47	23.5	58	20.6	134	24.4
Total	29	100.0%	29	100.0%	200	100.0%	282	100.0%	550	100.0%

Source: Medical Record Abstracts

Exhibit IV-31

Proportion of Patients in Each of Four Surgical Settings Using Specified Medications Prior to Admission

Medication in Current Use	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Steroids	6.8%	0.0%	4.2%	2.2%	3.2	28
Alkaloids	0.0	1.3	0.0	0.2	0.2	2
Tranquilizers	8.7	3.8	3.5	3.8	4.3	38
Anticonvulsants	1.0	0.0	0.4	0.5	0.5	4
Diuretic	5.8	2.6	1.4	1.9	2.3	20
Bronchodilators	4.9	1.3	1.4	2.2	2.2	19
Insulin	1.0	1.3	0.0	0.5	0.5	4
Antidepressants	0.0	0.0	0.7	0.5	0.5	4
Hypotensives	4.9	3.9	1.8	1.4	2.2	19
Contraceptives	3.9	10.3	2.1	7.2	5.4	48
Antihistamines	16.7	0.0	7.8	7.4	8.0	70
Hormones	14.6	6.4	11.3	8.9	10.1	89
Cardiogenics	5.8	0.0	0.0	0.7	1.0	9
Analgesics	5.8	3.8	2.5	2.4	3.0	26
Anticoagulants	0.0	0.0	0.0	0.2	0.1	1
Antibiotics	23.3	3.8	6.0	6.2	7.9	70
Other Medication	14.7	4.3	9.8	9.0	9.6	71
Total, all medications	n=103	n=78	n=284	n=417		882

Source: Medical
Record Abstracts

Exhibit IV-32

Statistical Significance Across Surgical Settings of Differences in Patient Use (prior to admission) of Selected Medications*

Medication in Current Use	% taking each medication prior to admission		Z value	Level of Significance
	Setting			
	IP	OP, HAASC, FSASC		
Steroids	6.8%	2.6%	1.65	.10
Tranquilizers	8.7	3.7	1.74	.08
Diuretics	5.8	1.8	1.70	.09
Bronchodilators	4.9	1.8	1.42	.16
Hypotensives	4.9	1.8	1.42	.16
Antihistamines	16.7	6.8	2.60	.01
Hormones	14.6	9.4	1.40	.16
Cardiogenics	5.8	.4	2.30	.02
Anagesics	5.8	2.6	1.35	.15
Antibiotics	23.3	5.9	4.09	.01
Other Medications	14.7	8.8	1.60	.11

*Using Z Distribution

Source: Previous Exhibit

eleven medications tested, differences in the proportion between the IP and ambulatory settings were significant $p < .10$ for: steroids, tranquilizers, diuretics, antihistimines, cardiogenics, and antibiotics. Therefore, patients in IP settings were more likely to be taking these medications prior to their surgical episode than were patients in the ambulatory settings.

Laboratory and Radiological Findings

Laboratory Findings - This section discusses laboratory findings of patients admitted for surgery in each of the four settings. It was possible for any of four substances -- protein, glucose, ketones, or blood -- to be found in a patient's urine. The presence of any of these would indicate a possible pathology for the patient that may have increased the risk of undergoing surgery. Thus, as in the previous sections, one could presume that such patients would be more likely to undergo surgery in the IP setting than in the others.

Exhibit IV-33 shows the proportion of patients undergoing surgery in each of the four settings who had positive urinalysis findings for each of the four substances. As is shown, protein was found in the urine of 3.1% of all patients, but in 8.7% of IP patients and 2.3% of non-IP patients (5.1% OP, 2.8% HAASC, and 1.4% of FSASC). As in the previous sections, the data suggest that patients with positive urinalysis findings were more likely to have surgery in the IP settings as compared to the ambulatory settings.

Exhibit IV-34 shows the level of statistical significance between the proportion of patients with positive urinalysis findings in the IP settings as compared with the ambulatory settings. Two of the substances, protein and blood, had differences that were found to be significant with $p \leq .10$.

Radiological Findings - The pattern of radiological findings for the patients in the sample was such that no meaningful analysis or description could be presented. Of the 882 patients sampled, 73 had chest x-rays taken and of those, 64 were IP patients. Thus no useful inter-setting comparison could be made. Of the total of 9 abnormal results found, only two were in non-IP patients. Finally, only seven patients in the entire sample had x-rays other than chest film taken prior to surgery.

Exhibit IV-33

Proportion of Patients in Each of Four Surgical Settings With Positive Findings in Uranalysis by Type of Substance

Substance Found	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Protein	8.7%	5.1%	2.8%	1.4%	3.1	27
Glucose	2.9	0.0	0.7	0.5	0.8	7
Ketones	3.9	2.6	2.8	0.2	1.7	15
Blood	9.7	10.3	3.5	1.7	4.0	35
Total, all substances	n=103	n=78	n=284	n=417		882

Source: Medical
Record Abstracts

Exhibit IV-34

Statistical Significance of Difference in Positive Urinalysis Findings Across Surgical Settings*

Substance Found	% with positive findings		Z value	Level of Significance
	Setting			
	IP	OP, HAASC, FSASC		
Protein	8.7%	2.3%	2.25	.02
Glucose	2.9	.5	1.44	.15
Ketones	3.9	1.4	1.28	.20
Blood	9.7	3.2	2.18	.03

*Using Z Distribution

Source: Previous Exhibit

Summary of Findings. From the analysis of demographic and medical characteristics of patients by type of surgical setting, the principal finding is as follows:

- Overall, the screening processes, both formal and informal, that match patients with appropriate surgical settings appeared to be working in that lower risk patients, as measured by the set of variables included in this analysis, were being treated in the HAASC and FSASC settings. The IP setting, quite properly, appeared to be treating the higher risk patients for the procedures studied. Surprisingly, the OP setting appeared to be accepting patients of higher risk than either the HAASC or FSASC settings.

This summary level finding is supported by the detailed findings on patient demographic and medical characteristics given below:

Demographic Characteristics:

- Age - For most procedures, there was little difference across settings in mean patient age. However, for the dilation and curettage and excision of breast mass procedures, IP patients were found to be significantly older -- and thus presumably at higher risk -- than patients in ambulatory settings.

- Race - 91.6% of all of the patients were white, 6.4% Hispanic, and 2.3% Black. Minority patients appeared to be under-represented in the sample generally but were over-represented in the OP setting due to the influence of one large institution.

Medical Characteristics:

- ASA Index - A large proportion (84.1%) of all of the patients undergoing these minor procedures were apparently relatively good risks for anesthesia, i.e., in category 1. However, the IP and OP settings accepted a proportionally greater number of patients in higher risk categories than did the HAASC and FSASC settings.

- Hemoglobin/Hematocrit Levels - Overall, 18.5% of all patients' combined hemoglobin/hematocrit levels were found to be below normal. However, 36.3% of the IP patients, 25.4% of OP, and 15.2% of both HAASC and FSASC patients were in this category. Thus, a significantly higher proportion of IP patients were found to have below normal readings as compared to FSASC and HAASC patients.

- Pre-existing conditions - For many specific pre-existing medical conditions which can cause a patient to present a higher risk profile, the IP setting included a significantly greater proportion of patients than the other settings. For heart disease, for instance, 6.8% of the IP patients reported this but 2.3% of the ambulatory patients. Other conditions appearing significantly more often in IP patients were lung disease, kidney disease, endocrine disorders, and major skeletal disorders.

- Obesity - A significantly greater proportion of patients having surgery in the OP setting were obese as compared with the patients in the IP, HAASC, and FSASC settings. The HAASC and FSASC settings had a greater proportion of patients with weights within the normal range for the patients' age and height than did the OP and IP settings.

- Medications in current use - Of patients using specific medications prior to their surgery, a significantly higher proportion had procedures performed in the IP setting as compared to the ambulatory settings. For example, 8.7% of the IP patients used tranquilizers, but only 3.7% of the ambulatory patients. Other medications for which a significant difference was detected were steroids, diuretics, antihistamines, cardiogenics, and antibiotics.

- Urinalysis findings - Of the substances found in patients' urine that could indicate a pathology, between .8% and 4.0% of patients displayed these findings. However, a substantially greater proportion of IP patients had positive findings as compared to ambulatory patients. The differences for protein and blood found in the urine were significant with $p \leq .10$ and the differences for glucose and ketones for $p \leq .20$.

Differences In Treatment Characteristics for Twelve Surgical Procedures

In this section, selected characteristics of the treatment of surgical patients are examined and the relationship of observed differences to the quality of surgical services are discussed. Because of the limited nature of the quality study and the difficulty in determining the medical significance of the differences among various treatment modalities, much of the information presented in this section is descriptive. Also, it should be noted that the process quality study excluded the specific surgical techniques employed by the physician. However, even with these limitations, differences in procedure treatment characteristics were detected.

Indications for Surgery. The indications for surgery are the explicit reasons given by the surgeon and recorded on the medical record for the proposed surgical procedure. It was expected that some differences in the frequency of specific indications would be observed between the inpatient and ambulatory surgical settings because of the hypothesized differences in patient risk and the seriousness of the patient's condition with higher risk and more serious patients being treated in the inpatient settings. However, it was recognized that the recording of specific indications might vary substantially between individual physicians and between institutions. As discussed in the structural quality analysis, the format of the medical records was very different from surgical setting to surgical setting. The format of the medical record as well as the need for justification for admission to an inpatient setting may be major factors in the thoroughness with which specific indications were recorded for a particular patient. These potentially confounding influences should be kept in mind as the differences in the frequency of specific indications are examined.

For each of the twelve procedures included in the study, a set of specific indications were developed. The patient's medical record was carefully reviewed to determine if one or more of the specific procedure indications were recorded in the history, pre-operative diagnosis, chief complaint, or pre-operative note fields of the medical records. The frequencies of specific indications by surgical setting for each surgical procedure included in the study are given in Exhibits IV-35 through IV-46. The major differences in the frequency of specific medications between settings for each surgical procedure are summarized in the following paragraphs.

- Myringotomy and Adenoidectomy - The most frequently mentioned indications across all four settings were recurrent infection (87.7%), fluid in the ear (69.1%) and hypertrophy of tissue (61.3%). Acute middle ear infection was given more frequently as an indication for the inpatient setting than for the ambulatory setting (70.6% for inpatient, 16.7% for outpatient, 14.3% for HAASC, 26.7% for FSASC). Hypertrophy was also more frequently given for the inpatient setting than for the ambulatory settings although the differences in the proportions were not as great. The proportion of patients in the other indications category was also higher for the inpatient setting than for the ambulatory settings. Decreased hearing and fluid in the ear were mentioned less frequently for the FSASC setting (0.0% and 53.3%) than for the hospital based surgical settings. Decreased hearing was given for 47.1% and fluid for 76.5% of the inpatients. It would appear that patients with the more serious types of indications such as acute infection, decreased hearing, and hypertrophy were being treated in the hospital based-settings -- particularly the inpatient settings.

- Tonsillectomy and Adenoidectomy - The most frequently recorded indication for the procedure was tonsillitis, with 82.5% of the patients undergoing this procedure having this indication listed on the medical record. However, two other indications were also mentioned relatively frequently, but with the major differences in the proportions noted between the FSASC and the hospital based settings rather than between the inpatient and

Exhibit IV-35

Proportion of Patients Showing Specific Indications for Surgery: Myringotomy and Adenoidectomy

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Recurrent ear infections (otitis media)	100.0%	100.0%	85.7%	80.0%	87.7	71
Acute middle ear infection	70.6	16.7	14.3	26.7	30.9	25
Drainage	5.9	16.7	0.0	6.7	4.9	4
Decreased hearing	47.1	33.3	35.7	0.0	24.7	20
Fluid	76.5	83.3	78.6	53.3	69.1	56
Replace tube	0.0	33.3	3.6	3.4	5.0	4
Hypertrophy	88.2	66.7	60.7	44.8	61.3	49
Other	46.7	16.7	25.0	3.7	21.1	16
Total n, this Procedure	n=17	n=6	n=28	n=30		81

Source: Medical Record Abstracts

Exhibit IV-36

Proportion of Patients Showing Specific Indications for Surgery: Tonsillectomy and Adenoidectomy

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Recurrent ear infection (otitis media)	15.8%	0.0%	13.0%	0.0%	10.3	6
Recurrent sore throat	52.6	0.0	43.5	13.3	37.9	22
Rheumatic fever	0.0	0.0	0.0	0.0	0.0	1
Rheumatic heart disease	0.0	0.0	0.0	0.0	0.0	0
Hemorrhage	0.0	0.0	4.3	0.0	1.7	1
Abscess	5.3	0.0	0.0	0.0	1.7	1
Hypertrophy	78.9	0.0	52.2	33.3	55.2	32
Other (tonsillitis)	78.9	0.0	82.6	86.7	82.5	47
Total n, this Procedure	n=19	n=1	n=23	n=15		58

Source: Medical
Record Abstracts

ambulatory settings. Recurrent sore throat was given as an indication for 52.6% of the patients treated in the inpatient setting and 43.3% of the HAASC patients; however, it was mentioned for only 13.3% of the tonsillectomy and adenoidectomy patients at the FSASC. A similar pattern was noted for hypertrophy with 78.9% inpatient and 52.2% HAASC compared with 33.3% of the FSASC patients.

- Dilation and Curettage (diagnostic) - Menorrhagia was the most frequently listed indication for this procedure with 86.9% of all dilation and curettage patients included in the study. For the inpatient and outpatient settings, the "other" indication, dysmenorrhea, and uterine mass were mentioned proportionately more often than in the HAASC and FSASC settings. In addition, metaplasia was mentioned for three (16.7%) of the patients having dilation and curettage in the outpatient setting. Although the number of observations was quite small and confirming evidence weak, the relatively larger proportion of patients with perhaps more serious indications (uterine mass, metaplasia) in the outpatient setting as compared with the HAASC and FSASC settings may reflect inappropriate screening of patients for the outpatient settings. It would appear that the patients with the least serious conditions were being treated in the ambulatory surgical center settings.

- Laparoscopy with Bilateral Tubal Coagulation - Elective sterilization was the most frequent indication for laparoscopy with bilateral tubal coagulation, reflecting the increased interest in this procedure as the contraceptive method of choice. Although the inpatient sample was too small to make any inferences, it would appear that patients treated in the other two hospital-based surgical settings were somewhat more likely to have "other" indications listed than were the FSASC setting patients. Almost thirty percent of the HAASC patients had listed a preexisting condition as an indication for surgery as compared to 9.5% of the FSASC patients. The outpatient setting listed the "other" category for 21.6% of its patients as compared to 14.3% of the FSASC patients.

Exhibit IV-37

Proportion of Patients Showing
Specific Indications for Surgery:
Dilation and Curettage

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Menorrhigia (abnormal bleeding, excessive menstruation)	94.4%	94.4%	88.5%	81.0%	86.9	139
Uterine mass	16.7	11.1	4.9	3.2	6.3	10
Amenorrhea (no menstruation)	5.6	5.6	1.6	1.6	2.5	4
Cervical abnormality	5.6	5.6	3.3	4.8	4.4	7
Recurrent endometrial infection	0.0	0.0	3.3	0.0	1.3	2
Metaplasia (evidence of abnormal tissue change)	0.0	16.7	1.6	4.8	4.4	7
Dysmenorrhea (painful menstruation)	16.7	11.1	3.3	3.2	5.6	9
Other	38.9	33.3	13.1	14.3	18.8	30
Total n, this Procedure	n=18	n=18	n=61	n=63		160

Source: Medical
Record Abstracts

Exhibit IV-38

Proportion of Patients Showing Specific Indications for Surgery: Laparoscopy with Bilateral Tubal Coagulation

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Sterilization, elective	100.0%	94.6%	100.0%	77.8%	88.3	121
Sterilization, (because of pre-existing condition)	66.7	0.0	29.4	9.5	13.1	18
Biopsy	0.0	0.0	0.0	0.0	0.0	19
Other	66.7	21.6	0.0	14.3	14.0	19
Total n, this Procedure	n=3	n=37	n=34	n=63		137

Source: Medical Record Abstracts

- Excision of Breast Mass - The "other" category, which includes lump, mass, swelling, and growth, was the most frequently listed indication. It appeared that the condition tended to be described as a tumor in the FSASC and inpatient settings and more frequently as a cyst in the HAASC setting. This is probably the result of the differences in terminology or conventions used by the physicians treating patients in the study.

- Ganglionectomy - As expected, the presence of a ganglion was given as the most frequent indication (95.8% of all patients). This is not surprising because of the specific and easily recognizable nature of the condition. There was a slight tendency for the indications tumor and cyst to also be listed on the medical record in the HAASC setting. Too few observations were obtainable for inpatients and outpatients to permit any comparions with these settings.

- Inguinal Herniorrhaphy - This procedure was observed in sufficient numbers only in the FSASC setting for any analysis. All of the 38 patients in the FSASC setting had inguinal hernia listed as the indication -- again because of the specific nature of the condition. Fifteen percent of the patients also had an indication also listed in the "other" category.

- Vasectomy - The only indication given for the 48 patients in the study was elective sterilization.

- Circumcision - This procedure was observed primarily in the FSASC setting. The most frequently cited indication in this setting was balanitis (58.3%) which is an inflammation of the glans penis usually associated with phimosis. Phimosis, a tightness of the foreskin, was given as an indication for 41.7% of the patients while 25.0% had indications in the "other" category.

- Augmentation Mammoplasty - Small breasts were recorded as the primary indication for 88.3% of the patients included in the study. However, in a few cases assymmetry and other indications such as previous breast surgery were also given. There was a slight tendency for these last two indications to be more frequently

Exhibit IV-39

Proportion of Patients Showing Specific Indications for Surgery: Excision of Breast Mass

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Tumor	42.9%	100.0%	12.1%	60.0%	39.3	33
Cyst	28.6	50.0	27.3	2.9	17.9	15
Other	71.4	50.0	84.8	51.4	67.9	57
Total n, this Procedure	n=14	n=2	n=33	n=35		84

Source: Medical
Record Abstracts

Exhibit IV-40

Proportion of Patients Showing Specific Indications for Surgery: Ganglionectomy

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Tumor	0.0%	0.0%	7.4%	0.0%	2.8	2
Cyst	0.0	0.0	18.5	10.3	12.7	9
Ganglion	100.0	100.0	92.6	97.4	95.8	68
Other	0.0	0.0	14.8	10.3	11.3	8
Total n, this Procedure	n=3	n=2	n=27	n=39		71

Source: Medical Record Abstracts

Exhibit IV-41

Proportion of Patients Showing Specific Indications for Surgery: Inguinal Herniorrhaphy

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Inguinal hernia	100.0%	100.0%	100.0%	100.0%	100.0	48
Other	50.0	50.0	0.0	15.8	20.8	10
Total n, this Procedure	n=6	n=2	n=2	n=38		48

Source: Medical Record Abstracts

Exhibit IV-42

Proportion of Patients Showing Specific Indications for Surgery: Vasectomy

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Sterilization	-	-	100.0%	100.0%	100.0	48
Other	-	-	0.0	0.0	0.0	0
Total n, this Procedure	n=0	n=0	n=6	n=42		48

Source: Medical Record Abstracts

Exhibit IV-43

Proportion of Patients Showing Specific Indications for Surgery: Circumcision

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Painful urination	0.0%	-	0.0%	0.0%	0.0	0
Painful erection	0.0	-	0.0	0.0	0.0	0
Inflammation of foreskin	100.0	-	0.0	8.3	17.6	3
Phimosis (tightness of foreskin)	100.0	-	33.3	41.7	47.1	8
Balanitis	0.0	-	33.3	58.3	47.1	8
Cosmetic	0.0	-	33.3	0.0	5.9	1
Ritual	0.0	-	0.0	0.0	0.0	0
Other	0.0	-	33.3	25.0	23.5	4
Total n, this Procedure	n=2	n=0	n=3	n=12		17

Source: Medical Record Abstracts

Exhibit IV-44

Proportion of Patients Showing Specific Indications for Surgery: Augmentation Mammoplasty

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Small breasts	0.0%	85.7%	92.6%	88.0%	88.3	53
Asymmetry	0.0	14.3	3.7	4.0	5.0	3
Other (previous breast surgery)	100.0	28.6	14.8	16.0	18.3	11
Total n, this Procedure	n=1	n=7	n=27	n=25		60

Source: Medical
Record Abstracts

listed in the outpatient setting; however, the number of observations is so small that little confidence should be placed in the observed difference in proportion.

- Advancement and Recession of Eye Muscle - Strabismus, a deviation of the eye which the patient cannot overcome and nystagmus, an involuntary movement of the eyeball, were the most frequent indications for the procedure for all patients with 91.4% and 40.0% respectively. The inpatient and FSASC indications were very similar in the distribution between these two major indications. For the HAASC, however, nystagmus was mentioned much less frequently than for the other settings with only 16.0% of the patients having this indication on the medical record.

- Excision of Lipoma or Sebaceous Cyst - This procedure was observed in sufficient numbers in only the HAASC and FSASC settings. Nothing of import was found with respect to the recording of indications except that "tumor" was generally used to refer to the growth in the FSASC; whereas, cyst was more frequently mentioned in the HAASC medical records for patients undergoing this procedure.

Anesthesia Use. The use of anesthesia was examined from two aspects. First, the distribution of patients between general and local anesthesia type for the specific procedures included in the study was inspected to determine if the selection of general or local anesthetic systematically varied by procedure or by surgical setting. Second, the use of specific anesthesia agents was analyzed for all patients undergoing general or regional anesthesia. This analysis examined only the presence or absence of the anesthesia agent during the surgical episode, not the flow rates or mix of anesthetic agents used during the procedure.

Anesthesia Type - For the procedures included in the study, it was apparent that the majority of patients were given a general anesthetic. Overall, 86.1% of the cases used a general, .3% of the cases used a regional, and a local anesthetic was used in 13.4% of the cases. For five of the twelve surgical procedures included in the study, a general anesthetic was used in all of the cases. These procedures were: Myringotomy and adenoidectomy, tonsillectomy and

Exhibit IV-45

Proportion of Patients Showing Specific Indications for Surgery: Advancement and Recession of Eye Muscle

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Strabismus (all tropias including cyclotropia, esotropia, extropia, hypertropia; Also cast, heterotropia, manifest deviation and squint)	100.0%	100.0%	88.0%	88.9%	91.4	64
Nystagmus	52.9	100.0	16.0	51.9	40.0	28
Other	0.0	0.0	16.0	11.1	10.1	7
Total n, this Procedure	n=17	n=1	n=25	n=27		70

Source: Medical Record Abstracts

Exhibit IV-46

Proportion of Patients Showing Specific Indications for Surgery: Excision of Lipoma or Sebaceous Cyst

Indication	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Tumor (Lipoma or cystic tumor)	100.0%	50.0%	23.1%	75.0%	59.1	26
Cosmetic	0.0	0.0	0.0	0.0	0.0	0
Cyst	0.0	0.0	53.8	14.3	25.0	11
Other	0.0	100.0	15.4	14.3	18.2	8
Total n, this Procedure	n=1	n=2	n=13	n=28		44

Source: Medical Record Abstracts

adenoidectomy, laparoscopy with BTC, inguinal herniorrhaphy, and advancement or recession of eye muscle. For dilation and curettage a general anesthetic was given in all cases except for one inpatient who was administered only a local anesthetic. Because little or no variation was observed for these procedures, the tables showing the distribution of anesthetic type are not included here. However, for the five procedures that experienced variation in the type of anesthetic given within or between surgical settings, the distribution of anesthetic types is given in Exhibits IV-47 through IV-51 on the following pages.

Exhibit IV-47 shows the use of anesthetic for excision of breast mass. As is shown, 88.1% of all cases used a general anesthetic and 11.9% were given a local. All 14 IP cases used a general, while 84.8% and 88.6% of the HAASC and FSASC cases, respectively, used a general. While the difference between the IP and ambulatory surgical centers was relatively small, it is notable that 15.2% and 11.4% used a local anesthetic in the HAASC and FSASC settings, respectively, while a local was not used in any cases in the IP settings.

Exhibit IV-48 shows the type of anesthetic used for the ganglionectomy procedure. For all settings, 84.5% were general, 4.2% regional, and 11.3% local. This was the only procedure in the study for which a regional anesthetic was administered. Although relatively few cases were observed, all patients in the IP and OP settings were given a general anesthetic for this procedure. The HAASC and FSASC were very similiar in the distribution of anesthetic type with 81.5% and 84.6% of the patients respectively given a general anesthetic.

The vasectomy procedure was primarily observed in the FSASC setting where two thirds of the 42 patients had the procedure performed under a local anethetic. Although only six cases were observed in the HAASC setting, it is interesting to note that all six were done under a general anesthetic. The distribution is given in Exhibit IV-49.

Exhibit IV-50 presents the distribution of anesthetic type by surgical setting for augmentation mammoplasty. For this procedure substantial variation among surgical settings was observed. In the OP setting, all of the seven cases were

Exhibit IV-47

Type of Anesthetic Used, by Setting: Excision of Breast Mass

Type of Anesthetic	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
General	100.0%	50.0%	84.8%	88.6%	88.1	74
Local	0.0	50.0	15.2	11.4	11.9	10
Total, all types, this procedure	n = 14	n = 2	n = 33	n = 35	100.0	84

Source: Medical
Record Abstracts

Exhibit IV-48

Type of Anesthetic Used, by Setting: Ganglionectomy

Type of Anesthetic	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
General	100.0%	100.0%	81.5%	84.6%	84.5	60
Regional ● Block	0.0	0.0	3.7	5.1	4.2	3
Local	0.0	0.0	14.8	10.3	11.3	8
Total, all types, this procedure	n = 3	n = 2	n = 27	n = 39	100.0	71

Source: Medical Record Abstracts

Exhibit IV-49

Type of Anesthetic Used, by Setting: Vasectomy

Type of Anesthetic	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
General	-	-	100.0%	33.3%	41.7	20
Local	-	-	0.0	66.7	58.3	28
Total, all types, this procedure	n = 0	n = 0	n = 6	n = 42	100.0	48

Source: Medical Record Abstracts

Exhibit IV-50

Type of Anesthetic Used, by Setting: Augmentation Mammsplasty

Type of Anesthetic	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
General	100.0%	0.0%	51.9%	16.0%	31.7	19
Local	0.0	100.0	48.1	84.0	68.3	41
Total, all types, this procedure	n = 1	n = 7	n = 27	n = 25	100.0	60

Source: Medical Record Abstracts

performed under a local anesthetic; in the HAASC setting 48.1% were given a local; while in the FSASC 84.0% were performed under a local. Only one IP procedure was observed. Therefore, this procedure appeared to be performed more frequently under a local anesthetic in the OP and FSASC settings than in the HAASC setting.

The distribution of anesthetic type for excision of lipoma and sebaceous cyst is shown in Exhibit IV-51. The HAASC and the FSASC had approximately the same distribution with almost two-thirds of the patients in both settings administered a local anesthesia. Too few cases were observed in either the IP or OP settings to draw any conclusions about the distribution of anesthetic type in these settings.

Anesthetic Agents - The use of specific anesthesic agents for the patients included in the study was abstracted from the medical record. The frequency of the use of each agent by surgical setting for patients given either a general or regional anesthetic is presented in Exhibit IV-52. As may be seen from the exhibit, the use of nitrous oxide in combination with oxygen is universal as an anesthesic agent. However, for the other agents some variation across settings was observed. Fluothane was more frequently used in the IP and HAASC settings (55.4% and 59.9% respectively) than in the OP or FSASC settings (39.1% and 46.9% respectively). Barbiturates, primarily sodium pentathal, were used to induce anesthesia in more than two-thirds of the patients undergoing surgery in the OP, HAASC, and FSASC settings. Barbiturates appeared to be less frequently used in the IP setting. A similar pattern was observed for succinyl choline chlorides, or anectine, a skeletal muscle relaxant, which was administered in the IP setting 43.6% of the time, whereas it was given in more than half of the cases in each of the ambulatory settings. Ethrane was given more often in the IP and OP settings (33.7% and 42.0% respectively) than in the HAASC and FSASC setting (13.7% and 17.8). However, it was in the use of D. tubo curare that the FSASC setting differed most from the other surgical settings. Forty-four percent of the patients undergoing surgery at the FSASC were given D. tubo curare as compared with 20.3% in OP, 6.0% in the HAASC, and 5.0% in the IP setting. This substance is used as a skeletal muscle relaxant.

Exhibit IV-51

Type of Anesthetic Used, by Setting: Excision of Lipoma and Cyst

Type of Anesthetic	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
General	100.0%	50.0%	38.5%	35.7%	38.6	17
Local	0.0	50.0	61.5	64.3	61.4	27
Total, all types, this procedure	n = 1	n = 2	n = 13	n = 28	100.0	44

Source: Medical Record Abstracts

Use of Anesthesia Agent by Surgical Setting for Patients With General or Regional Anesthesia

Surgical Setting / Anesthesia Agent	Inpatient	Outpatient	HAASC	FSASC	Total	
	%	%	%	%	N	%
Nitrous Oxide	99.0	100.0	99.2	99.7	759	99.5
Oxygen	100.0	100.0	99.6	98.7	759	99.7
Fluothane	55.4	39.1	59.9	46.9	759	51.6
Barbiturates	52.5	76.8	72.2	68.2	759	68.2
D. Tubo Curare	5.0	20.3	6.0	44.5	759	24.2
Anectine	43.6	72.5	50.4	60.5	759	56.0
Ethrane	33.7	42.0	13.5	17.8	759	20.7
Total Number of Observations	101	69	252	337	759	100.0%

Source: Medical Record Abstracts

Operative Findings. The operative findings were recorded for each procedure included in the study and were coded from the report of operation, final diagnosis, and report of tissue examination sections of the medical record. It was expected that the proportions of operative findings would differ somewhat among surgical settings for selected procedures with generally more serious findings reported for the patients in the IP setting. However, as can be seen from the distribution of operative findings by surgical setting presented in Exhibits IV-53 through IV-64 for each of the procedures included in the study, no consistent pattern of findings emerged that distinguished one surgical setting from another. The major operative findings are summarized in the following paragraphs:

- Myringotomy and Adenoidectomy - The most frequently mentioned finding was fluid in the ear, with this finding reported for 86.4% of all patients. Other miscellaneous findings were the next most frequently reported category of findings.

- Tonsillectomy and Adenoidectomy - Reporting of findings was apparently much less frequent in the FSASC setting for this procedure than in the other three settings. The most frequently reported findings were hypertrophied tonsils or adenoids and cryptic tonsils or adenoids.

- Dilation and Curettage - Cervical pathology and uterine pathology were the most frequently listed operative findings with cervical pathology more frequently found in patients undergoing surgery in the hospital-based settings and uterine pathology reported more often in the FSASC setting. Proliferative endometrial tissue was also frequently given as an operative finding and reported more frequently in the FSASC and OP settings than in the IP and HAASC settings.

- Laparoscopy with Bilateral Tubal Coagulation - No variation of importance was noted in the distribution of operative findings by setting for this procedure.

- Excision of Breast Mass - No variation of importance was noted in the distribution of operative findings by setting for this procedure. It appeared that the breast mass was more frequently referred to as a tumor in the IP and HAASC settings and as a cyst in the FSASC setting.

Exhibit IV-53

Operative Findings: Myringotomy and Adenoidectomy

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
nflamed tympanic membrane	5.9%	0.0%	3.6%	13.3%	7.4	6
istorted tympanic membrane (scarred)	5.9	0.0	32.1	6.7	14.8	12
uptured tympanic membrane	5.9	0.0	0.0	0.0	1.2	1
xisting tube	0.0	16.7	0.0	0.0	1.2	1
luid (pus, serous, serosanguineous)	34.1	66.7	96.4	76.7	86.4	70
ther	76.5	66.7	92.9	44.8	70.0	56
otal n, this Procedure	n=17	n=6	n=28	n=29		80

Source: Medical Record Abstracts

Exhibit IV-54

Operative Findings:
Tonsillectomy and Adenoidectomy

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Hypertrophied tonsils/adenoids	63.2%	100.0%	95.7%	20.0%	65.5	38
Infected tonsils/adenoids	42.1	0.0	26.1	13.3	27.6	16
Cryptic tonsils/adenoids	63.2	0.0	30.4	20.0	37.9	22
Abscess peritonsillar	5.3	0.0	0.0	0.0	1.7	1
Scarred tonsils/adenoids	0.0	0.0	17.4	0.0	6.9	4
Bleeding site on tonsils or adenoids	26.3	0.0	4.3	0.0	10.3	6
Other	15.8	0.0	8.7	13.3	12.1	7
Total n, this Procedure	n=19	n=1	n=23	n=15		58

Source: Medical
Record Abstracts

Exhibit IV-55

Operative Findings: Dilation and Curettage

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
ervical pathology (bleeding, inflammation, erosion, polyp)	44.4%	50.0%	50.8%	28.6%	41.3	66
ecretory endometrial tissue	27.8	33.3	29.5	23.8	27.5	44
roliferative endometrial tissue	22.2	44.4	31.7	47.6	38.4	61
roduct of conception	5.6	5.6	1.6	4.8	3.8	6
terine pathology (polyps, myomas)	44.4	38.9	41.0	41.3	41.3	66
UD	5.6	5.9	0.0	1.6	1.9	3
ther	33.3	35.3	26.2	22.2	26.4	42
otal n, this Procedure	n=18	n=18	n=61	n=63		160

Source: Medical Record Abstracts

Exhibit IV-56

Operative Findings: Laparoscopy with Bilateral Tubal Coagulation

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Description of fallopian tubes	66.7%	75.7%	82.4%	49.2%	65.0	89
Description of ovaries	66.7	81.1	79.4	44.4	63.5	87
Description of uterus	66.7	73.0	88.2	39.7	61.3	84
Other	33.3	51.4	29.4	17.5	29.9	41
Total n, this Procedure	n=3	n=37	n=34	n=63		137

Source: Medical Record Abstracts

Exhibit IV-57

Operative Findings: Excision of Breast Mass

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
yst	92.9%	50.0%	75.8%	42.9%	64.3	54
umor	35.7	100.0	36.4	62.9	48.8	41
ther	35.7	0.0	60.6	37.1	45.2	38
otal n, this Procedure	n=14	n=2	n=33	n=35		84

Source: Medical Record Abstracts

- Ganglionectomy - No significant variation was noted in the distribution of operative findings between the HAASC and FSASC settings for this procedure. The number of observations in the IP and OP settings was too small to make any inferences about these settings.

- Inguinal Herniorrhaphy - Inguinal hernia and hernia sac were reported as operative findings in almost of all of the patients undergoing this procedure included in the study.

- Vasectomy - No significant variation was noted in the operative findings for the HAASC and FSASC settings for this procedure.

- Circumcision - The FSASC was the only setting in which a sufficient number of observations of this procedure was made. The most frequently mentioned findings were in the "other" category and prominent (or redundant) foreskin.

- Augmentation Mammoplasty - Findings were not recorded in all of these procedures; however the typical findings included a description of breast size and shape.

- Advancement and Recession of Eye Muscle - Tropia was the most frequently reported operative finding in each of the surgical settings.

- Excision of Lipoma or Sebaceous Cyst - The only difference in operative findings for this procedure was for a tumor to be generally recorded in the FSASC setting (85.7%) and a cyst to be more frequently mentioned in the HAASC setting (53.8%). The number of observations in the IP and OP setting were too few to determine a distribution.

Tissue Examination and Findings. The proportion of cases by procedure and surgical setting for which pathology examination of tissue was performed is shown in Exhibit IV-65. It is apparent that for several procedures pathology examination was performed in more than ninety percent of the cases in all surgical settings. These procedures include dilation and curettage,

Exhibit IV-58

Operative Findings: Ganglionectomy

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
yst	100.0%	50.0%	63.0%	51.3%	57.7	41
umor	0.0	50.0	18.5	5.1	11.3	8
anglion	66.7	100.0	81.5	97.4	90.1	64
ther	33.3	0.0	18.5	20.5	19.7	14
Total n, this Procedure	n=3	n=2	n=27	n=39		71

Source: Medical Record Abstracts

Exhibit IV-59

Operative Findings:
Inguinal Herniorrhapy

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Inguinal hernia	100.0%	100.0%	100.0%	100.0%	100.0	48
Hydrocele	33.3	50.0	0.0	18.4	20.8	10
Hernial sac	100.0	100.0	100.0	97.4	97.9	47
Undescended testicle	0.0	0.0	0.0	7.9	6.3	3
Other	33.3	50.0	0.0	26.3	27.1	13
Total n, this Procedure	n=6	n=2	n=2	n=38		48

Source: Medical
Record Abstracts

Exhibit IV-60

Operative Findings:
Vasectomy

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Description of vas	-	-	100.0%	76.2%	79.2	38
Other	-	-	0.0	4.8	4.2	2
Total n, this Procedure	n=0	n=0	n=6	n=42		48

Source: Medical
Record Abstracts

Exhibit IV-61

Operative Findings:
Circumcision

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Scarred foreskin	0.0%	-	0.0%	16.7%	11.8	2
Contracted foreskin	100.0	-	0.0	16.7	23.5	4
Infected foreskin	100.0	-	0.0	8.3	17.6	3
Prominent foreskin (redundant)	0.0	-	33.3	25.0	23.5	4
Normal foreskin	0.0	-	0.0	0.0	0.0	0
Other	100.0	-	66.7	36.4	50.0	8
Total n, this Procedure	n=2	n=0	n=3	n=12		17

Source: Medical
Record Abstracts

Exhibit IV-62

Operative Findings: Augmentation Mammoplasty

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
scription of breast size and shape	100.0%	28.6%	48.1%	48.0%	46.7	28
her	0.0	28.6	29.6	28.0	28.3	17
tal n, this Procedure	n=1	n=7	n=27	n=25		60

Source: Medical Record Abstracts

Exhibit IV-63

Operative Findings: Advancement and Recession of Eye Muscle

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Tropia	88.2%	100.0%	75.0%	59.3%	72.5	50
Other	0.0	0.0	25.0	7.4	11.6	8
Total n, this Procedure	n=17	n=1	n=24	n=27		69

Source: Medical
Record Abstracts

Exhibit IV-64

Operative Findings: Excision Lipoma or Sebaceous Cyst

Finding	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
umor (Lipoma)	0.0%	100.0%	38.5%	85.7%	70.5	31
yst	0.0	0.0	53.8	25.0	31.8	14
ther	100.0	0.0	15.4	25.0	22.7	10
otal n, this Procedure	n=1	n=2	n=13	n=28		44

Source: Medical
Record Abstracts

Exhibit IV-65

Proportion of Patients Undergoing 12 Surgical Procedures for Whom Pathology Performed, Across Surgical Settings

Procedure	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Myringotomy Procedure (with tubes) and Adenoidectomy	100.0%	100.0%	100.0%	13.3%	67.9	81
Tonsillectomy and Adenoidectomy	100.0	100.0	100.0	13.3	77.6	58
Dilation and Curettage	100.0	100.0	100.0	98.4	99.4	160
Laparoscopy with Tubal Coagulation	33.3	0.0	0.0	1.6	1.5	137
Excision of Breast Mass	100.0	100.0	100.0	100.0	100.0	84
Excision of Ganglion	100.0	100.0	96.3	89.7	93.0	71
Inguinal Herniorrhaphy	100.0	100.0	100.0	92.1	93.8	48
Vasectomy	-	-	100.0	97.6	97.9	48
Circumcision	100.0	-	100.0	33.3	52.9	17
Augmentation Mammoplasty	0.0	14.3	7.4	8.0	8.3	60
Eye Muscle Operation	5.9	0.0	0.0	0.0	1.4	70
Excision of Lipoma or Sebaceous Cyst	100.0	100.0	100.0	100.0	100.0	44
Total n for each setting, all procedures	n = 103	n = 78	n = 284	n = 417	63.9	882

Source: Medical
Record Abstracts

excision of breast mass, inguinal herniorraphy vasectomy, and excision of lipoma or sebaceous cyst. For excision of breast mass and lipoma or sebaceous cyst, tissue was examined by a pathologist in 100% of the cases included in the study. For selected surgical procedures, the FSASC differed substantially from the other hospital-based settings in the proportion of cases in which tissue was examined. Most notable were myringotomy with adenoidectomy and tonsillectomy and adenoidectomy where in only 13.3% of the FSASC cases was tissue submitted for pathology examination as compared to 100% of the cases treated in the IP, OP, and HAASC settings. Only one third of the tissues resulting from circumcision procedures performed in the FSASC setting were examined compared to all tissues in the IP and HAASC setting. For ganglions 89.7% of the FSASC cases were submitted for tissue examination whereas all cases observed in the IP and OP settings were examined and 96.3% of the HAASC cases. For laparoscopy with BTC and the eye muscle operation, pathology examination of tissue was found to occur more frequently in the IP setting than in the ambulatory settings; however, the proportion of cases was relatively small (33.3% for laparoscopy with BTC and 5.9% for eye muscle operations performed in an IP setting.) The smaller proportion of pathology examinations for selected procedures observed in the FSASC setting may be a result of the emphasis placed by the facility on the surgeon's discretion in the use of pathology services, which were provided by outside arrangement. The hospital based settings have in-house pathology services and typically most tissue removed from patients was sent to the laboratory for microscopic examination.

The proportion of cases in which pathology was performed in which malignancy was reported was also examined. The results of this investigation were inconclusive, since only eleven cases (across all settings) out of the 562 in which pathology was performed were found to have malignancies. Of these eleven, seven were found as a result of dilation and curettage procedures, two in excision of breast mass, and two in excision of cyst or lipoma. No malignancies were detected as a result of any of the other nine procedures. It was not possible from this very limited number to draw any conclusions concerning the occurence of malignancies across surgical settings.

Patient Time In Phase. The principal characteristics of the patient episode that differentiated the inpatient from the ambulatory surgical setting was the amount of time the patient spent in the surgical facility. In this section, the time the patient spent in the facility is examined for each of the twelve procedures included in the study and systematic differences between settings are discussed. Furthermore, the analysis of patient time was performed for each of the four phases of in-facility activity including preoperative phase, operative phase, post-operative phase, and the recuperative phase for the inpatient setting and inpatient transfer from the outpatient or HAASC settings. Patient time spent in the phases of the surgical episode provided insight into both the characteristics of the surgical procedure and of facility utilization. Clearly, it is an important indirect measure of the cost of patient care in that the longer the patient was in the facility the more resources were generally required to maintain and care for the patient. These aspects of differences in patient time by surgical setting are related more to the cost of the surgical episode than to the quality of surgical services.

However, two aspects of the patient time analysis are directly related to the issues of quality of care and are discussed in more detail than are the other components of time spent by phase. Length of time the patient is under anesthesia and in the operative phase is one measure of procedure risk. The longer the patient is under anesthesia and in the operating room, the greater the likelihood of an anesthetic or operative complication developing. One of the characteristics of "minor" surgical procedures mentioned by physicians in response to the physician interview was a short duration for the procedure. A second aspect of the time spent by the patient that relates to quality is the duration of the post-operative and in-facility recuperative phases. All of the ambulatory surgical settings included in the study had either explicit or implicit policies concerning the length of time in the recovery room and the patient's condition upon discharge from the facility. It was important for the safety of the patient that the condition and vital signs be stabilized prior to discharge and that the patient be fully conscious and capable of some level of self care. This concept is central to the practice of ambulatory surgery.

In the following paragraphs, the differences among alternative surgical settings in the patient time by phase is discussed with particular attention to the two relevant quality issues discussed above.

Total Procedure Time - Total procedure time is defined as the amount of time spent by the patient in the surgical facility from the time admitted for the surgery to the time of discharge. Exhibit IV-66 presents the total procedure time in minutes by surgical setting for each of the twelve procedures included in the study.

Compared across surgical settings, the total times for all twelve procedures were, of course, greater for the IP setting than for any of the ambulatory settings. The average total procedure time was found to be less in the FSASC setting than in the OP setting for three of the four procedures where more than three cases were observed. Augmentation mammoplasty required on the average 220.6 minutes in the OP setting versus 291.6 minutes in the FSASC setting. When compared to the HAASC setting, the FSASC average procedure times were less for six of eleven comparable procedures included in the study.

In the inpatient setting it may be seen that for the procedures in which three or more patients were observed that the average total time ranged from 2121.0 minutes (1.5 days) for an inguinal herniorrhaphy to 3417.4 minutes (2.4 days) for excision of breast mass. Because most patients in the inpatient surgical setting are admitted between 12 noon and 4 p.m. on the day prior to surgery it would appear that patients undergoing myringotomy with adenoidectomy, tonsillectomy and adenoidectomy, dilation and curettage, laparoscopy with BTC, or ganglionectomy in the inpatient setting spent two nights in the hospital--one night prior to the day of surgery and one day after surgery. Based on conversations with facility personnel and a brief review of the data, it was determined that inguinal herniorrhaphy patients tended to be released the day of surgery into the care of their parents since the procedure was performed exclusively on children in the sample. They also were generally admitted earlier in the day and as a result had a longer preoperative time. Patients undergoing excision of breast mass in the inpatient setting also typically spent two nights in the hospital; however, these patients apparently are, like inguinal herniorrhaphy patients, admitted somewhat earlier in the day resulting in a somewhat longer total procedure time.

In the outpatient setting, the total procedure time varied somewhat from 220.6 minutes (3.7 hours) for augmentation mammoplasty patients to 483.0 minutes (8.1 hours) for

Exhibit IV-66

Total Procedure Time, in Minutes, Across Surgical Settings

Procedure	Setting											
	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
Myringotomy Procedure (with tubes) and Adenoidectomy	2433.5	482.6	17	3172.5	365.6	6	250.3	262.9	28	185.6	33.1	30
Tonsillectomy and Adenoidectomy	2883.2	553.8	19	2910.0	0.0	1	1470.8	357.9	23	350.0	35.1	15
Dilation and Curettage	2913.4	1819.0	18	483.0	1005.6	18	207.9	266.2	61	170.8	31.2	63
Laparoscopy with Tubal Coagulation	2755.0	1205.6	3	300.8	77.7	37	184.6	31.1	34	215.4	55.4	63
Excision of Breast Mass	3417.4	1951.8	14	897.5	1043.0	2	219.8	216.5	33	203.1	46.7	35
Excision of Ganglion	2690.0	116.5	3	230.0	28.3	2	180.3	32.9	27	205.1	32.6	39
Inguinal Herniorraphy	2121.0	799.6	5	263.0	46.7	2	186.5	2.1	2	197.0	55.6	38
Vasectomy	-	-	-	-	-	-	282.5	301.6	6	158.0	42.1	42
Circumcision	2587.5	10.6	2	-	-	-	201.7	7.6	3	192.1	35.1	12
Aumentation Mammoplasty	6655.0	0.0	1	220.6	51.2	7	276.7	45.9	27	291.6	61.5	25
Eye Muscle Operation	2369.1	715.0	16	1445.0	0.0	1	201.6	22.4	25	232.5	63.5	27
Excision of Lipoma or Sebaceous Cyst	4136.0	0.0	1	195.0	42.4	2	152.1	46.3	13	167.9	49.9	28

Source: Medical
Record Abstracts

dilation and curettage. The shorter total duration for the augmentation mammoplasty procedure probably was because the procedure was performed under a local anesthetic which required less patient time in the recovery room.

In the HAASC setting the total procedure time ranged from 152.1 minutes (2.5 hours) for excision of lipoma or sebaceous cyst to 1470.8 minutes (24.5 hours) for a tonsillectomy and adenoidectomy. The length of time for a tonsillectomy and adenoidectomy reflects the frequent practice in one of the HAASCs for these patients to be post-operatively admitted to an inpatient hospital for overnight observation. If this procedure is omitted, the longest duration procedure was vasectomy with an average stay of 282.5 minutes (4.7 hours). As previously noted, in the HAASC setting the vasectomy procedures observed in this study were all performed under a general anesthetic.

In the FSASC setting the total procedure time was least for the vasectomy procedure in contrast to the HAASC. In the FSASC, two-thirds of the vasectomy procedures were performed under a local anesthetic, probably accounting for the difference in overall procedure time. The procedure for which the patient remained in the facility the longest period of time was tonsillectomy and adenoidectomy with an average stay of 350.0 minutes (5.8 hours). Discussions with facility nursing staff showed that this relatively long duration reflected the concern of the physician and the facility with the potential for post-operative complications such as hemorrhage.

Pre-Operative Time - Preoperative time is defined as the period between the admission to the facility in which the surgery was performed and the transfer to the operating room. The preoperative time by procedure and surgical setting is presented in Exhibit IV-67. Because the patients in the IP setting were admitted to the hospital the day before the surgery, the time is, by definition, greater than in the ambulatory settings. For the inpatient setting the preoperative range of from eighteen hours for laparoscopy with BTC to twenty-three hours for inguinal herniorrhaphy showed that patients for all procedures were generally admitted the day before the surgery; patients scheduled for breast mass excision and inguinal herniorrhaphy were

Exhibit IV-67

Pre-Operative Time, in Minutes, Across Surgical Settings

Procedure	Setting											
	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
Myringotomy Procedure (with tubes) and Adenoidectomy	1132.1	297.4	17	90.4	49.2	5	69.4	16.4	28	53.9	24.7	30
Tonsillectomy and Adenoidectomy	1112.1	113.4	19	-	-	-	82.3	20.2	23	57.4	23.9	15
Dilation and Curettage	1104.5	249.7	18	157.6	343.8	18	60.1	18.0	61	51.3	20.5	63
Laparoscopy with Tubal Coagulation	1096.7	189.2	3	105.1	70.2	36	61.8	15.8	34	61.4	20.8	63
Excision of Breast Mass	1329.6	373.2	14	100.0	7.1	2	74.0	21.3	33	61.6	16.1	35
Excision of Ganglion	1151.7	154.3	3	57.5	10.6	2	72.6	26.7	29	64.2	24.3	39
Inguinal Herniorraphy	1415.8	227.0	6	150.0	35.4	2	49.0	22.6	2	59.5	24.2	38
Vasectomy	-	-	-	-	-	-	146.4	283.1	7	63.4	21.7	41
Circumcision	1065.0	7.1	2	-	-	-	71.7	32.1	3	56.7	12.2	12
Aumentation Mammoplasty	990.0	0.0	1	89.3	36.6	7	80.2	34.5	27	83.7	29.7	25
Eye Muscle Operation	1244.1	351.5	16	135.0	0.0	1	70.1	19.7	25	63.9	24.9	27
Excision of Lipoma or Sebaceous Cyst	1446.0	0.0	1	107.5	24.8	2	71.0	17.7	13	62.1	23.9	28

Source: Medical
Record Abstracts

typically admitted earlier than other patients. In contrast, preoperative times in the ambulatory settings ranged from less than an hour to two and one-half hours.

However, in some procedures substantial differences were also observed among the ambulatory settings with patients in the FSASC setting generally experiencing lower average preoperative time than patients in either the HAASC or OP settings.

For OP the preoperative phase lasted between one and one-half hours and two hours for the four procedures for which the average duration could be computed. In the HAASC setting most of the procedures had average durations of somewhat more than an hour; however, the average preoperative time for the vasectomy procedure was 146.4 minutes (2.4 hours), substantially longer than any other procedure in the HAASC setting.

In the FSASC setting the average preoperative time was very uniform, ranging from 51.3 minutes for a dilation and curettage to 83.7 minutes for a augmentation mammoplasty. The FSASC setting had shorter average preoperative times than the OP setting for all four of the procedures in which average times could be computed. The preoperative time was also shorter in the FSASC setting for ten of eleven procedures when compared with the HAASC setting. Only for augmentation mammoplasty was the average preoperative time less in the HAASC than in the FSASC; however the difference in this case was quite small. The generally shorter time in the FSASC setting probably reflects the somewhat more extensive lab work generally done on patients in the HAASC and OP settings as well as the need for the patient in these settings to obtain laboratory services from another department of the hospital often physically distant from the preoperative holding area. As described in the structural quality analysis, the FSASC performed a minimum of laboratory tests in a small lab immediately adjacent to the preoperative holding area.

Operative Time - The time spent by the patient in the operating room is given in Exhibit IV-68. The times by procedure were remarkably consistent across surgical settings with the largest inter-setting difference occurring for augmentation mammoplasties between the HAASC setting (120.4

Exhibit IV-68

Operative Time, in Minutes, Across Surgical Settings

Procedure	Setting											
	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
Myringotomy Procedure (with tubes) and Adenoidectomy	36.6	8.6	17	37.2	14.3	6	35.6	9.1	28	31.4	10.1	30
Tonsillectomy and Adenoidectomy	37.4	16.7	19	25.0	0.0	1	39.6	7.5	23	44.9	11.7	15
Dilation and Curettage	26.3	8.2	18	20.8	6.5	18	23.1	4.9	61	19.7	6.1	63
Laparoscopy with Tubal Coagulation	46.7	2.9	3	41.9	13.1	37	35.1	7.9	34	33.1	7.6	63
Excision of Breast Mass	43.6	7.4	14	42.5	3.5	2	39.7	10.4	33	35.7	8.9	35
Excision of Ganglion	46.7	10.4	3	35.5	14.8	2	47.1	10.3	27	46.1	14.1	39
Inguinal Herniorraphy	36.7	4.1	6	55.0	14.1	2	75.0	7.1	2	52.2	11.4	38
Vasectomy	-	-	-	-	-	-	35.8	6.6	6	30.9	9.2	40
Circumcision	47.5	3.5	2	-	-	-	36.7	7.6	3	39.0	10.5	12
Aumentation Mammoplasty	115.0	0.0	1	98.9	31.7	77	120.4	29.3	27	104.8	21.8	25
Eye Muscle Operation	65.8	19.0	17	65.0	0.0	1	64.6	9.3	25	57.2	7.8	27
Excision of Lipoma or Sebaceous Cyst	40.0	0.0	1	35.0	28.2	2	37.3	11.2	13	37.6	18.1	28

Source: Medical

minutes) and the FSASC setting (104.8 minutes). Also of significance is the surprisingly short duration of several of the procedures that are most frequently performed in ambulatory settings. For example, a dilation and curettage required an average of 20.8 minutes in the OP setting, 23.1 minutes in the HAASC, and 19.7 minutes in the FSASC. A laparoscopy with BTC had average durations of 41.9 minutes in OP, 35.1 minutes in HAASC, and 33.1 minutes in the FSASC. It should be noted that the operative phase time was greater than the time the patient spent actually undergoing surgery. After entering the operating room, the patient is transferred to the operating table and anesthesia is induced. Only then is the surgery begun. After the actual surgery is completed the patient is taken off the anesthetic and transferred to a transport for the move to the recovery room. In the FSASC the operative time was less than the IP setting for six of eight procedures. Similarly three of four procedures required less operative phase time in the FSASC than in the OP setting. When the FSASC and HAASC settings were compared, eight of eleven procedures were performed with less time in the operating room in the FSASC setting than the HAASC setting.

Although the supporting information is not available since the actual process of care in the operating room was not observed, the systematic occurance of generally shorter procedure times in the FSASC setting when compared to the other settings, particularly inpatient, may reflect a somewhat higher level of efficiency in the operative phase activity in the FSASC setting. In addition, the shorter time in the operating room was also reflected in the shorter anesthetic time durations presented in Exhibit IV-69. This would seem to indicate that patients in the FSASC setting would generally be at lesser anesthetic risk from the procedure because of the reduced time under the influence of the anesthetic agents.

Post-Operative Time - Whereas in the preoperative and operative phases the FSASC generally experienced shorter average duration than the other settings, the opposite appeared to be true for the post-operative phase. This is shown in Exhibit IV-70. The average length of time spent by patients in the recovery room after surgery was greater in the FSASC setting for all eight procedures that could be

Exhibit IV-69

Patient Time Under Anesthesia,
in Minutes, Across Surgical Settings

Procedure	Setting											
	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
Myringotomy Procedure (with tubes) and Adenoidectomy	36.6	8.6	17	37.2	14.4	6	35.6	9.2	28	31.4	10.1	30
Tonsillectomy and Adenoidectomy	37.4	16.7	19	25.0	0.0	1	39.6	7.5	23	44.9	11.7	15
Dilation and Curettage	26.3	8.2	18	20.8	6.5	18	23.1	4.9	61	19.7	6.2	63
Laparoscopy with Tubal Coagulation	46.7	2.9	3	41.9	13.1	37	35.4	7.9	34	33.0	7.6	63
Excision of Breast Mass	43.6	7.4	14	42.5	3.5	2	39.7	10.4	33	35.8	8.9	35
Excision of Ganglion	46.7	10.4	3	35.5	14.8	2	47.1	10.3	27	46.1	14.1	39
Inguinal Herniorraphy	36.7	4.1	6	55.0	14.1	2	75.0	7.1	2	52.2	11.4	38
Vasectomy	-	-	-	-	-	-	35.8	6.6	6	30.9	9.2	42
Circumcision	47.5	3.5	2	-	-	-	36.7	7.6	3	39.1	10.5	12
Aumentation Mammoplasty	115.0	0.0	1	98.9	31.7	7	120.4	29.3	27	104.8	21.8	25
Eye Muscle Operation	65.9	19.1	17	65.0	0.0	1	64.6	9.3	25	57.2	7.8	27
Excision of Lipoma or Sebaceous Cyst	40.0	0.0	1	35.0	28.3	2	37.3	11.2	13	37.6	18.1	28

Source: Medical

Post-Operative Time, in Minutes, Across Surgical Settings

Procedure	Setting											
	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
Myringotomy Procedure (with tubes) and Adenoidectomy	55.9	21.6	17	85.8	60.9	6	94.1	22.2	28	97.7	13.9	30
Tonsillectomy and Adenoidectomy	67.6	34.7	19	60.0	0.0	1	77.6	53.8	23	246.1	29.9	15
Dilation and Curettage	81.2	25.4	17	142.1	43.2	18	76.5	21.0	61	98.0	29.9	63
Laparoscopy with Tubal Coagulation	85.0	5.0	3	149.6	33.1	37	86.5	27.5	34	118.9	45.6	63
Excision of Breast Mass	60.6	18.7	14	40.0	35.4	2	68.0	22.1	33	104.4	47.1	35
Excision of Ganglion	86.7	16.1	3	130.0	0.0	2	63.0	18.9	27	97.8	30.5	39
Inguinal Herniorraphy	46.7	12.9	6	60.0	0.0	2	62.5	17.7	2	82.9	44.7	38
Vasectomy	-	-	-	-	-	-	78.3	18.1	6	62.7	34.7	42
Circumcision	67.5	17.7	2	-	-	-	95.0	47.7	3	93.9	38.5	12
Aumentation Mammoplasty	135.0	0.0	1	49.8	30.3	4	74.8	21.1	27	98.6	61.1	25
Eye Muscle Operation	57.6	18.0	17	40.0	0.0	1	67.4	11.4	25	109.2	52.4	27
Excision of Lipoma or Sebaceous Cyst	65.0	0.0	1	37.5	31.8	2	44.2	23.5	13	61.8	37.6	28

Source: Medical
Record Abstracts

compared between the FSASC and inpatient settings. This is probably attributable to the fact that the inpatients are not expected to be as fully recovered from the effects of the anesthetic upon discharge from the recovery room than the patients in the ambulatory settings. The inpatients are, of course, transferred to a nursing ward where they were observed by the nursing staff during their remaining stay. In the inpatient setting the post-operative time ranged from 46.7 minutes for an inguinal herniorrhaphy to 86.7 minutes for excision of ganglion. In the FSASC setting the post-operative time ranged from 61.8 minutes for excision of lipoma or sebaceous cyst to 246.1 minutes (4.1 hours) for a tonsillectomy and adenoidectomy. The time in the recovery room for tonsillectomy and adenoidectomy patients was more than double the length of stay for any other procedure in the FSASC setting. Based on conversations with facility personnel and a brief review of the data, it appeared that this reflected the concern of the physician and facility over possible post-operative bleeding complications for this procedure. In the HAASC setting patients generally stayed less time than in the FSASC setting. Only for two of eleven procedures was the FSASC post-operative time less than that in the HAASC. For vasectomy the shorter time in the FSASC as compared to the HAASC was probably a result of two thirds of the procedures in the FSASC being performed under local anesthetic. The other procedure was circumcision where the difference in average post-operative time was just over a minute - a difference not statistically significant. The substantial difference in post-operative time for the tonsillectomy and adenoidectomy procedure between the FSASC and HAASC setting (246.1 minutes and 77.6 minutes respectively) is attributable to the policy of one HAASC to post-operatively admit these patients to the inpatient hospital for overnight observation. Therefore, the requirements for discharge from the recovery room in the HAASC setting were somewhat less stringent than in the FSASC setting.

In the OP setting only four procedures had three or more observations for comparison with the FSASC setting. The dilation and curettage and laparoscopy with BTC procedures in the OP setting had greater average post-operative time than the FSASC setting. Myringotomy with adenoidectomy and augmentation mammoplasty had shorter post-operative times than the FSASC setting; however, it should be noted that the standard deviations on these two procedures were large in comparison to the mean, thereby weakening the validity of the comparison.

In-Facility Recuperative Time - Only the in-facility component of the recuperative phase is presented in this section. Differences in the lengths of the entire recuperative phase are discussed in the outcome quality assessment section of this chapter. Inpatients, except for some of the children undergoing inguinal herniorrhaphy had an in-facility component of the recuperative phase. For those procedures with three or more patients in the IP setting, the average stay ranged from 1391 minutes (33.2 hours) for excision of ganglion to 1970.1 minutes (32.8 hours) for excision of breast mass -- all representing one overnight stay. However, as can be seen from Exhibit IV-71, five patients in the OP setting and 25 patients in the HAASC setting were post-operatively admitted to the inpatient hospital and, therefore, also had in-facility recuperative times. Because of the very small number of patients per procedure little may be inferred from these data. However, as previously mentioned, 21 of the 23 tonsillectomy and adenoidectomy patients in the HAASC setting were admitted to the hospital. The average in-facility recuperative time for these patients was 1387.3 minutes (23.1 hours).

Exhibit IV-72 presents, in summary form, the average time in minutes by surgical setting and phase for the twelve procedures included in the study. It may be seen from the descriptive analysis in the preceding sections and from the summary exhibit that the FSASC appeared to be more efficient in moving patients through the preoperative and operative phases than were the other ambulatory settings. A comparison with the IP setting is not particularly relevant since the IP preoperative time includes an overnight hospital stay. Furthermore, it would appear that the FSASC generally retains patients in the recovery room to monitor postoperative reaction and status at least as long or longer than the OP or HAASC settings for most procedures. There was no evidence that the FSASC was prematurely discharging patients in comparison to other ambulatory surgical settings. The IP setting appeared to have shorter post-operative times for most procedures because the patients in that setting were transferred to a ward and were under immediate and continuous nursing supervision. Wakefulness and return of motor skills

Exhibit IV-71

Recuperative Time, In Minutes, Across Surgical Settings

Procedure	Setting											
	IP			OP			HAASC			FSASC		
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n
Myringotomy Procedure (with tubes) and Adenoidectomy	1402.9	229.4	14	1110.0	0.0	1	1405.0	0.0	1	-	-	-
Tonsillectomy and Adenoidectomy*	1653.4	500.0	19	1320.0	0.0	1	1387.3	64.4	21	-	-	-
Dilation and Curettage	1755.0	1836.3	17	2790.0	0.0	1	1430.0	7.1	2	-	-	-
Laparoscopy with Tubal Coagulation	2012.5	1276.3	2	-	-	-	-	-	-	-	-	-
Excision of Breast Mass	1970.1	1629.0	14	1370.0	0.0	1	1255.0	0.0	1	-	-	-
Excision of Ganglion	1391.7	82.8	3	-	-	-	-	-	-	-	-	-
Inguinal Herniorraphy	1320.0	212.1	2	-	-	-	-	-	-	-	-	-
Vasectomy	-	-	-	-	-	-	-	-	-	-	-	-
Circumcision	1412.5	45.9	2	-	-	-	-	-	-	-	-	-
Aumentation Mammoplasty	5400.0	0.0	1	-	-	-	-	-	-	-	-	-
Eye Muscle Operation	1448.8	235.6	12	1205.0	0.0	1	-	-	-	-	-	-
Excision of Lipoma or Sebaceous Cyst	2580.0	0.0	1	-	-	-	-	-	-	-	-	-

*Many of the tonsillectomy and adenoidectomy procedures in one HAASC reflected the practice of planned post-operative admission of patients to the inpatient facility, thus accounting for the elongated recuperative time.

Source: Medical
Record Abstracts

Exhibit IV-72

Comparison for 12 Procedures of Surgical Time Across Settings, by Procedure Phase

Time in Minutes

Procedures/Setting	Procedure Phase			
Myringotomy and Adenoidectomy	Pre-Operative	Operative	Post-Operative	Recuperative
IP	1132	37	56	1403
OP	64	37	86	*
HAASC	69	36	94	*
FSASC	54	31	98	*
Tonsillectomy and Adenoidectomy				
IP	1112	37	68	1653
OP	*	*	*	*
HAASC	82	40	78	1387
FSASC	57	45	246	*
Dilation and Curettage				
IP	1105	26	81	1755
OP	158	21	142	*
HAASC	60	23	77	*
FSASC	51	20	98	*

*Indicates fewer than 3 cases in that cell

Note: The recuperation times in this exhibit are computed only where 3 or more cases are present in a cell and only include those cases which had at least some recuperative time. Thus, the total procedure times across all phases may not exactly equal those in Exhibit IV-66.

Source: Medical
Record Abstracts

Exhibit IV-72 — (cont.)

Time in Minutes

Procedures/Setting	Procedure Phase			
Augmentation Mammoplasty	Pre-Operative	Operative	Post-Operative	Recuperative
IP	*	*	*	*
OP	89	99	50	*
HAASC	80	120	75	*
FSASC	84	105	99	*
Eye Muscle Operation				
IP	1157	66	58	1449
OP	*	*	*	*
HAASC	70	65	67	*
FSASC	64	57	109	*
Excision of Lipoma or Cyst				
IP	*	*	*	*
OP	*	*	*	*
HAASC	71	37	44	*
FSASC	62	38	62	*

*indicates fewer than 3 cases in that cell

Source: Medical
Record Abstracts

Exhibit IV-72 — (cont.)

Time in Minutes

Procedures/Setting	Procedure Phase			
Inguinal Herniorrhaphy	Pre-Operative	Operative	Post-Operative	Recuperative
IP	1416	37	47	*
OP	*	*	*	*
HAASC	*	*	*	*
FSASC	60	52	83	*
Vasectomy				
IP	*	*	*	*
OP	*	*	*	*
HAASC	168	36	78	*
FSASC	28	16	63	*
Circumcision				
IP	*	*	*	*
OP	*	*	*	*
HAASC	72	37	95	*
FSASC	57	39	94	*

*Indicates fewer than 3 cases in that cell

Source: Medical
Record Abstracts

Exhibit IV-72 — (cont.)

Time in Minutes

Procedures/Setting	Procedure Phase			
Laparoscopy BTC	Pre-Operative	Operative	Post-Operative	Recuperative
IP	1097	47	85	*
OP	105	20	150	*
HAASC	62	35	87	*
FSASC	61	33	119	*
Excision of Mass Breast				
IP	1330	44	61	1970
OP	*	*	*	*
HAASC	74	40	68	*
FSASC	62	36	104	*
Ganglionectomy				
IP	1152	47	87	1392
OP	*	*	*	*
HAASC	*	47	63	*
FSASC	64	46	98	*

*Indicates fewer than 3 cases in that cell

Source: Medical
Record Abstracts

ere less critical determinants of patients' status for ppropriate recovery discharge time in the IP setting than in the mbulatory settings.

Personnel Time In Phase. The amount of personnel time spent irectly with the patients included in the study was also xamined as part of the process quality assessment for each of he procedures in three of the four surgical settings. It was mpossible to present comparable data for the IP setting, since t was not possible to observe patients over most of the reoperative phase, i.e., that time (normally ranging from 16 to 0 hours) that they spent on the wards prior to their surgery. Only the last two hours were observed.) Exhibit IV-73 presents these data for all personnel and for four individual personnel ategories:

- Surgeon
- Anesthesiologist
- RN, LPN, O.R. Technician
- Aide, Orderly, Volunteer.

he ratio of personnel time to patient time in each surgical setting for each procedure was also computed to adjust for differences in the length of patient stay among procedures and settings.

When compared to the OP setting, the FSASC setting experienced less total personnel time for four of the five comparable procedures. Augmentation mammoplasty was the exception using 427 minutes of personnel time in the OP setting and 484 minutes in the FSASC setting. As in the FSASC setting, dilation and curettage for the OP setting was the procedure using the least total personnel time, with an average of 160 minutes.

For the eleven comparable procedures in the HAASC and FSASC settings, the results of the analysis of total personnel time spent with the patients were mixed. In four procedures, the FSASC used less personnel time in the pre-operative, operative,

Exhibit IV-73

Personnel Time Spent in Surgical Episode by Surgical Settings

Myringotomy and Adenoidectomy	Outpatient	HAASC	FSASC
Total Time in Minutes, All Personnel	258	191	191
M.D. Time	35	27	30
Anesthesiologist Time	40	38	40
R.N. Time	177	112	110
Aide Time	5	11	12
Ratio, Personnel Time to Patient Time, All Personnel	1.41	1.08	1.14
M.D. Time	.20	.16	.18
Anesthesiologist Time	.22	.22	.24
R.N. Time	.96	.63	.67
Aide Time	.03	.07	.07
Tonsillectomy and Adenoidectomy			
Total Time in Minutes, All Personnel	-	199	284
M.D. Time		32	41
Anesthesiologist Time		43	54
R.N. Time		121	180
Aide Time		1	4
Ratio, Personnel Time to Patient Time, All Personnel	-	1.27	.86
M.D. Time		.20	.13
Anesthesiologist Time		.28	.16
R.N. Time		.77	.55
Aide Time		.01	.01

Source: Resource Utilization Study
Note: Totals may not add exactly due to rounding
- Indicates no cases in that cell
* Indicates fewer than 3 cases in that cell

Exhibit IV-73 - (Cont.)

Dilation and Curretage	Outpatient		HAASC		FSASC	
Total Time in Minutes, All Personnel	160		127		100	
M.D. Time		24		15		15
Anesthesiologist Time		29		22		23
R.N. Time		99		76		59
Aide Time		9		13		0
Ratio, Personnel Time to Patient Time, All Personnel	70		.97		.67	
M.D. Time		.10		.11		.10
Anesthesiologist Time		13		.15		.16
R.N. Time		.43		.53		.39
Aide Time		.04		.08		.0
Laparoscopy with BTC						
Total Time in Minutes, All Personnel	332		200		185	
M.D. Time		67		30		33
Anesthesiologist Time		59		35		39
R.N. Time		186		119		109
Aide Time		27		15		1
Ratio, Personnel Time to Patient Time, All Personnel	1.20		1.20		.99	
M.D. Time		.24		.19		.18
Anesthesiologist Time		.21		.21		.21
R.N. Time		.68		.72		.58
Aide Time		.10		.08		.01

Source: Resource Utilization Study

Exhibit IV-73 - (Cont.)

Breast Mass Excision	Outpatient	MAASC	FSASC
Total Time in Minutes, All Personnel	*	192	196
M.D. Time		37	35
Anesthesiologist Time		35	38
R.N. Time		115	116
Aide Time		4	7
Ratio, Personnel Time to Patient Time, All Personnel	*	1.17	1.07
M.D. Time		.22	.19
Anesthesiologist Time		.21	.20
R.N. Time		.71	.63
Aide Time		.02	.03
Ganglionectomy			
Total Time in Minutes, All Personnel	*	223	243
M.D. Time		43	46
Anesthesiologist Time		46	49
R.N. Time		133	139
Aide Time		1	6
Ratio, Personnel Time to Patient Time, All Personnel	*	1.37	1.29
M.D. Time		.26	.24
Anesthesiologist Time		.28	.25
R.N. Time		.82	.75
Aide Time		.00	.03

Source: Resource Utilization Study
*Indicates fewer than three cases in that cell

Exhibit IV-73 - (Cont.)

Inguinal Herniorrhaphy	Outpatient	HAASC	FSASC
Total Time in Minutes, All Personnel			333
M.D. Time			72
Anesthesiologist Time			63
R.N. Time			163
Aide Time			51
Ratio, Personnel Time to Patient Time, All Personnel			1.94
M.D. Time			.42
Anesthesiologist Time			.37
R.N. Time			.95
Aide Time			.28
Vasectomy			
Total Time in Minutes, All Personnel	-	156	157
M.D. Time		26	34
Anesthesiologist Time		35	16
R.N. Time		94	105
Aide Time		0	1
Ratio, Personnel Time to Patient Time, All Personnel	-	.93	1.18
M.D. Time		.15	.26
Anesthesiologist Time		.21	.10
R.N. Time		56	.79
Aide Time		.00	.00

Source: Resource Utilization Study

Exhibit IV-73 - (Cont.)

Circumcision	Outpatient		HAASC		FSASC	
Total Time in Minutes, All Personnel	-		175		208	
M.D. Time				30		36
Anesthesiologist Time				32		33
R.N. Time				105		136
Aide Time				8		1
Ratio, Personnel Time to Patient Time, All Personnel	-		.97		1.22	
M.D. Time				.16		.22
Anesthesiologist Time				.18		.19
R.N. Time				.58		.80
Aide Time				.04		.00
Augmentation Mammoplasty						
Total Time in Minutes, All Personnel	427		490		484	
M.D. Time		142		125		133
Anesthesiologist Time		0		67		25
R.N. Time		279		298		305
Aide Time		40		1		25
Ratio, Personnel Time to Patient Time, All Personnel	1.95		1.94		1.83	
M.D. Time		.67		.49		.52
Anesthesiologist Time		.0		.27		.08
R.N. Time		1.24		1.17		1.16
Aide Time		.22		.00		.10

Source: Resource Utilization Study

Exhibit IV-73 - (Cont.)

Eye Muscle Operation	Outpatient	MAASC	FSASC
Total Time in Minutes, All Personnel	-	344	333
M.D. Time		54	52
Anesthesiologist Time		64	65
R.N. Time		224	202
Aide Time		0	10
Ratio, Personnel Time to Patient Time, All Personnel	-	1.85	1.68
M.D. Time		.29	.26
Anesthesiologist Time		.35	.33
R.N. Time		1.21	1.01
Aide Time		.00	.06
Excision of Lipoma or Cyst			
Total Time in Minutes, All Personnel	220	183	204
M.D. Time	40	36	44
Anesthesiologist Time	41	20	23
R.N. Time	135	115	132
Aide Time	2	12	0
Ratio, Personnel Time to Patient Time, All Personnel	1.42	1.36	1.41
M.D. Time	.30	.28	.32
Anesthesiologist Time	.21	.12	.13
R.N. Time	.87	.90	.93
Aide Time	.03	.06	.00

Source: Resource Utilization Study

and post-operative phases, six procedures required more time in the FSASC and for one procedure the average personnel time was the same between the two settings. For the HAASC setting, dilation and curettage was, again, the procedure consuming the least personnel time (127 minutes) and augmentation mammoplasty required the most personnel time with 490 minutes.

When the ratios of personnel time to patient time were examined, the pattern of smaller amounts of personnel involvement with the patient in the FSASC than in the other alternative settings was made somewhat more distinct. Comparisons of the FSASC to the OP setting showed less personnel time per patient in direct patient contact for all five comparable procedures; seven of the eleven comparable procedures between the HAASC and FSASC setting showed less personnel intensity for the FSASC setting.

When the categories of personnel were examined for differences in total personnel time among surgical settings, it may be seen that the ambulatory settings were very similar in the time utilization for the surgeon and anesthesiologist with all but two procedures experiencing differences of less than 10 minutes between ambulatory settings. Only laparoscopy with BTC, which used an average of 67 minutes of surgeon time in the OP setting as compared with 30 in the HAASC and 33 minutes in the FSASC, and augmentation mammoplasty, with 142 minutes of surgeon time in OP versus 125 minutes in HAASC and 133 minutes in FSASC setting, had differences between ambulatory settings of greater than 10 minutes. This was apparently the result of the use of two surgeons in the operating room in the OP setting for the patients undergoing the procedures in the study.

Of the four personnel categories, the nursing category made up the larger proportion of total personnel time and also exhibited the most variation across surgical settings. For example, for dilation and curettage, nursing time made up 52% of the total time in the OP setting, 60% in HAASC, and 59% in FSASC settings. Across procedures and settings the proportion of nursing time to total time ranged from 46% for laparoscopy with BTC performed inpatient to 69% for myringotomy with adenoidectomy in the OP setting.

Exhibits IV-74 through IV-77 show the distribution of total personnel time and nursing time by phase and surgical setting for myringotomy with adenoidectomy, tonsillectomy and adenoidectomy, dilation and curettage, and laparoscopy with bilateral tubal

Exhibit IV-74

Distribution of Personnel Time by Surgical Phase and Setting: Myringotomy with Adenoidectomy

	Surgical Phase			
INPATIENT*	Pre-Operative	Operative	Post-Operative	Total-All Phases
Total time in minutes, all personnel	-	155	47	212
Ratio, personnel time to patient time, all personnel	-	4.06	.90	.22
R.N. time	-	82	39	130
Ratio, R.N. time to patient time	-	2.17	.75	.13
OUTPATIENT				
Total time in minutes, all personnel	41	156	61	258
Ratio, personnel time to patient time, all personnel	.67	3.67	.82	1.41
R.N. time	36	88	53	177
Ratio, R.N. time to patient time	.63	2.02	.73	.96
HAASC				
Total time in minutes, all personnel	31	126	34	191
Ratio, personnel time to patient time, all personnel	.58	3.97	.39	1.08
R.N. time	21	65	26	112
Ratio, R.N. time to patient time	.39	2.06	.29	.63
FSASC				
Total time in minutes, all personnel	17	134	40	191
Ratio, personnel time to patient time, all personnel	51	4.10	.41	1.15
R.N. time	12	67	31	110
Ratio, R.N. time to patient time	.26	2.08	33	.67

*The pre-operative and personnel time for inpatients could not be recorded reliably due to the inability of the surgical observer teams to record personnel activities on the hospital wards, except in the time periods immediately before and immediately following the procedure.

Exhibit IV-75

Distribution of Personnel Time by Surgical Phase and Setting: Tonsillectomy and Adenoidectomy

	Surgical Phase			
INPATIENT*	Pre-Operative	Operative	Post-Operative	Total-All Phases
Total time in minutes, all personnel	-	194	69	269
Ratio, personnel time to patient time, all personnel	-	4.19	1.05	.22
R.N. time	-	93	58	158
Ratio, R.N. time to patient time	-	2.10	.89	.13
OUTPATIENT				
Total time in minutes, all personnel	-	-	-	-
Ratio, personnel time to patient time, all personnel	-	-	-	-
R.N. time	-	-	-	-
Ratio, R.N. time to patient time	-	-	-	-
HAASC				
Total time in minutes, all personnel	31	137	30	199
Ratio, personnel time to patient time, all personnel	.58	3.86	.47	1.27
R.N. time	24	71	26	121
Ratio, R.N. time to patient time	.44	1.99	.41	.77
FSASC				
Total time in minutes, all personnel	18	186	80	284
Ratio, personnel time to patient time, all personnel	.59	4.00	.32	.86
R.N. time	12	93	75	180
Ratio, R.N. time to patient time	.42	2.00	.31	.55

*The pre-operative and personnel time for inpatients could not be recorded reliably due to the inability of the surgical observer teams to record personnel activities on the hospital wards, except in the time periods immediately before and immediately following the procedure.

Exhibit IV-76

Distribution of Personnel Time by Surgical Phase and Setting: Dilation and Curretage

	Surgical Phase			
INPATIENT*	Pre-Operative	Operative	Post-Operative	Total-All Phases
Total time in minutes, all personnel	-	96	34	147
Ratio, personnel time to patient time, all personnel	-	3.62	.42	.14
R.N. time	-	42	28	85
Ratio, R.N. time to patient time	-	1.65	.35	.08
OUTPATIENT				
Total time in minutes, all personnel	18	93	49	160
Ratio, personnel time to patient time, all personnel	.36	3.22	.34	.70
R.N. time	15	39	45	99
Ratio, R.N. time to patient time	.30	1.34	.32	.43
HAASC				
Total time in minutes, all personnel	20	59	49	127
Ratio, personnel time to patient time, all personnel	.46	3.29	.53	.87
R.N. time	14	27	35	76
Ratio, R.N. time to patient time	.34	1.53	.40	.53
FSASC				
Total time in minutes, all personnel	15	58	27	100
Ratio, personnel time to patient time, all personnel	.46	3.12	.28	.67
R.N. time	10	24	25	59
Ratio, R.N. time to patient time	.30	1.26	.26	.39

*The pre-operative and personnel time for inpatients could not be recorded reliably due to the inability of the surgical observer teams to record personnel activities on the hospital wards, except in the time periods immediately before and immediately following the procedure.

Exhibit IV-77

Distribution of Personnel Time by Surgical Phase and Setting: Laparoscopy with Bilateral Tubal Coagulation

	Surgical Phase			
INPATIENT*	Pre-Operative	Operative	Post-Operative	Total-All Phases
Total time in minutes, all personnel	-	295	35	342
Ratio, personnel time to patient time, all personnel	-	4.46	.40	.28
R.N. time	-	119	24	156
Ratio, R.N. time to patient time	-	1.81	.28	.13
OUTPATIENT				
Total time in minutes, all personnel	27	246	58	332
Ratio, personnel time to patient time, all personnel	.46	4.76	.40	1.20
R.N. time	19	116	50	186
Ratio, R.N. time to patient time	.35	2.25	.35	.68
HAASC				
Total time in minutes, all personnel	22	142	36	200
Ratio, personnel time to patient time, all personnel	.54	4.44	.40	1.22
R.N. time	15	76	27	119
Ratio, R.N. time to patient time	.37	2.37	.31	.72
FSASC				
Total time in minutes, all personnel	17	133	35	185
Ratio, personnel time to patient time, all personnel	.46	3.91	.30	.99
R.N. time	11	65	32	109
Ratio, R.N. time to patient time	.32	1.92	.28	.58

*The pre-operative and personnel time for inpatients could not be recorded reliably due to the inability of the surgical observer teams to record personnel activities on the hospital wards, except in the time periods immediately before and immediately following the procedure.

coagulation. As can be seen from the distributions, most of the direct nursing time spent with the patient was in the operative phase. The post-operative phase required the next heaviest investment of nursing time of the three phases and the pre-operative phase required the least direct time.

For the four procedures, nursing time in the operative phase was less for the FSASC setting than the IP setting for myringotomy with adenoidectomy, dilation and curettage and laparoscopy with BTC. The average nursing time was equivalent for tonsillectomy and adenoidectomy. The OP setting and IP setting were similar in terms of amount of nursing time spent as were the HAASC and FSASC settings. Considerable variation was noted in the amount of nursing time spent in direct patient care in the post-operative phase. For example, less direct time was spent with the patient in the post-operative phase in the FSASC setting for dilation and curettage than in the other settings. The OP setting with 45.4 minutes of nursing time and the HAASC with 34.8 minutes are higher than the FSASC setting with 25.0 minutes. These differences may be the result of differences in case load in the recovery rooms of the various settings. The FSASC setting is high volume in comparison to the OP and HAASC settings. In the FSASC setting the nursing personnel have more patients to distribute their direct involvement time across than the OP and HAASC settings.

Summary of Findings. Based on the analysis of differences in treatment characteristics for the twelve surgical procedures, the following principal finding is warranted.

- No major differences between surgical settings in the treatment of comparable minor surgical procedures were identified. Although minor differences did occur, it was not apparent that these differences significantly affected the quality of the surgical process.

The following findings highlight the minor differences in treatment characteristics that were observed for the patients included in the study.

- For some procedures, particularly myringotomy and adenoidectomy and dilation and curettage, it would appear that patients with less serious indications were being treated in the ambulatory settings as compared with the IP setting.

- A general anesthetic was used for 86.1% of the patients included in the study. For excision of breast mass, ganglionectomy, vasectomy, circumcision, augmentation mammoplasty, and excision of lipoma or sebaceous cyst, some patients in the sample were given a local anesthetic. For vasectomy, augmentation mammoplasty, and excision of lipoma or sebaceous cyst a local anesthetic was given in 66.7%, 84.0%, and 64.3% of the cases respectively in the FSASC setting. The FSASC used local anesthetic a greater proportion of the time for these three procedures than did the HAASC setting. In the IP setting a general anesthetic was used in all but one case.

- The hospital-based settings were generally found to premedicate patients whereas in the FSASC setting premedication was generally not used.

- The only difference noted in the use of specific anesthetic agents among settings was the use of D. tubo curare in 44.5% of the cases in the FSASC setting. Twenty percent of the patients in the OP setting, and only 6.0% in the HAASC and 5.0% in the IP were given this anesthetic.

- No significant differences in the types or distribution of operative findings were noted among surgical settings for the procedures included in the study.

- For myringotomy with adenoidectomy, tonsillectomy and adenoidectomy and circumcision, pathology tissue examination was performed on only 13.3%, 13.3%, and 33.3% of the patients in the FSASC setting respectively compared with all patients undergoing these procedures in the hospital-based settings.

- From the analysis of patient time by phase of care in the facility, it appeared that the FSASC could move patients through the preoperative and operative phases with less delay.

- The FSASC setting generally held patients in the recovery room area at least as long as the other ambulatory settings. The FSASC was apparently not discharging patients prematurely from the facility.

- Personnel in the FSASC setting on the average spent less direct time with patients in the operating room and recovery room than personnel in the other surgical settings. For the operative phase this is in part accounted for by the shorter time in the operating room observed for FSASC patients for some procedures. The high volume of patients in the FSASC setting and IP setting recovery rooms may, in part, explain the lesser direct personnel time per patient observed in the post-operative phase for these two settings.

FINDINGS: OUTCOME QUALITY

In this section the findings related to the outcome quality of the surgical episode for the patients included in the study are discussed. The study of the outcome of the surgical episode is difficult both conceptually and in operationalization. It was difficult to develop a setting-sensitive group of outcome measures that could be examined within the limitations of time and resources of the project. For many types of surgeries, the outcome of the surgical episode may have several different levels of interpretation. A long period of time may be required before the ultimate effects of the surgical intervention on the health status and behavior of the patient may be comprehensively assessed. Such longer term issues, while important to the assessment of surgical outcome, were beyond the scope of this project to investigate.

Operational Definition

The concept of outcome quality for the purposes of this project was substantially limited. Five principal aspects of outcome quality were assessed with regard to minor surgery in alternative surgical settings. First, the frequency and rate of deaths occuring during and as a result of the surgery in the alternative settings were examined. However, it should be pointed out that the measure was not expected to be very sensitive for the study of outcome quality because of the general low death rate for surgery--particularly minor surgery. Indeed, in the history of the FSASC and the two HAASC settings included in the study, no patients have died as a result of surgery. The second component of the outcome quality assessment was what may be termed "intermediate" outcomes of the surgical episode and included the frequency and nature of unscheduled transfers from an ambulatory surgical setting to an inpatient surgical or recuperative setting as a result of an unexpected occurrence during the surgical episode which may or may not be threatening to the patient. Another intermediate outcome examined was the frequency of complications encountered during or after the surgery related to the surgical process itself.

The third area of study in the outcome quality assessment was the extent and duration of patient disability after discharge from the facility in which the surgery occurred. Disability was assessed in several ways including the number of bed days experienced in the recuperative phase and the number of days elapsed before the patient returned to normal routine or activity.

A major portion of the outcome quality study focussed on the satisfaction of the patient with several aspects of the surgical episode. Although very difficult to measure, it was expected that the levels of patient satisfaction may vary by surgical setting in part as a result of the very different environments that characterize the alternative surgical settings. Several elements of patient satisfaction discussed in the literature were included in the assessment.

The fifth component of the outcome quality assessment was the satisfaction of the physician with the alternative surgical settings. This was considered equally as important a factor as patient satisfaction because it was expected that the physician would base a satisfaction assessment on different criteria than the patient. Also, the extent of physician satisfaction with a surgical setting many be a principal determinant of the utilization of the surgical setting.

Although the operational definition of outcome quality used in the study was incomplete and avoided some of the larger, more difficult issues such as effects on overall health status, this approach examined several interesting aspects of outcome with regard to minor surgical services.

Surgical Deaths

In the FSASC and the two HAASCs included in the study, no patient deaths have occurred during or as a result of the surgery in the history of the facilities. The FSASC has provided service to 47,210 patients in the eight years between February, 1970 and December 1977 without a death. Similarly, the two HAASCs have provided surgical services to a cumulative total of 23,558 patients since their establishment without a surgical death.

Summary of Findings. From the absence of surgical deaths in the ambulatory surgical centers included in the study, it may be concluded:

- The ambulatory surgical center setting, from the standpoint of surgical death incidence and rate, has had an excellent record of quality patient care and safety. In this regard, the FSASC setting appeared to be at least as safe as the hospital-based ambulatory surgical center settings. It should be noted that although no surgical deaths occurred--a principal finding of the outcome quality study--this measure may not be sensitive enough to differentiate or discriminate between surgical settings with respect to other aspects of outcome quality.

Unscheduled Transfers

An unscheduled transfer was defined as the movement of the patient from the surgical setting in which the surgery was performed to another surgical or recuperative setting because of the unexpected nature of the operative or post-operative course. It should be noted that for two types of cases patients were transferred from the setting in which the surgery was performed to another setting of care as part of the regular plan of treatment anticipated by the physician and/or the facility prior to surgery. Tonsillectomy and adenoidectomy patients in one HAASC setting were, as previously discussed, transferred to an inpatient nursing ward for overnight observation. In addition, patients undergoing an augmentation mammoplasty were, in most cases, transferred to a convalescent care facility for an overnight stay during the recuperative phase. These cases were not defined as unscheduled transfers.

In the 882-patient sample, only three cases of unscheduled transfer from a surgical setting to another facility were found. All three incidents occurred at the FSASC and the patients were transferred to Good Samaritan Hospital located directly across the street from the FSASC. In none of the three cases was the patient transferred because of an emergency situation or an immediate threat to health and safety of the patient. All three cases involved the detection of an unsuspected malignancy and required follow-up surgery in the inpatient setting. The three cases are described briefly below:

- A thirty-two year old female was admitted to the FSASC for a dilation and curettage and a cervical biopsy. After the patient was anesthetized and prepared for the procedure, a large egg-sized tumor of the anterior lip of the cervix was visualized. The tumor was covered with a purulent type exulate and some free bleeding from the cervical opening was observed. A wedge biopsy from the anterior lip of the cervix was taken. The patient was transferred to Good Samaritan Hospital after 113 minutes in the FSASC recovery room. A hysterectomy was performed on the patient the following day at the inpatient facility.

- A twenty-nine year old female was admitted to the FSASC for an excision of a right breast tumor with frozen section. After general anesthesic was induced, the procedure was performed and the frozen section was sent to the pathologist for evaluation. The results of the evaluation indicated carcinoma of the breast and after 293 minutes in the recovery room of the FSASC the patient was transferred to Good Samaritan Hospital for additional breast surgery the next morning.

- A forty-year old female was admitted to the FSASC for excision of a left breast tumor with frozen section. After general anesthesic was administered the procedure was performed. A carcinoma of the duct was diagnosed and the patient was transferred to Good Samaritan Hosptial after 160 minutes in the recovery room of the FSASC. Further surgery was performed the same day in the inpatient facility.

<ins>Summary of Findings</ins>. From the low incidence of unscheduled transfers and the nature of the procedures for which the transfers were required, the following may be concluded:

- It appears that no life-threating emergencies developed in the FSASC or HAASC for the patients included in the sample that required transfer to another surgical setting. Therefore, with regard to this aspect of the quality of patient care and patient safety, the ambulatory surgical centers appear to have an excellent record.

- Although three unscheduled patient transfers were observed for the patients included in the sample, all three resulted from the detection of a malignancy and the need for additional surgery. None of the transfers appeared to be related to the type or level of patient care rendered in the FSASC setting.

- All three transfers observed occurred after the patient had spent time in the FSASC recovery room and the transfers were accomplished without incident. The proximity of a fully equipped major inpatient hospital across the street from the FSASC appeared to be an important factor in this transfer in that all three patients were subsequently admitted to this facility for further surgery.

Complications

A major indicator of the quality of surgical procedures is the rate at which medical and surgical complications occur. This section examines the occurrence of 18 specific complications that occurred, or potentially could have occurred, in connection with the 882 surgical cases in the sample. These are complications that were reported on the patient's medical record. The discussion is organized into three sections: First, the six complications are discussed that had no occurrence; second, the nine that had a small number of occurrences; and finally, the three that had a considerable number of occurrences. One additional aspect of complications, that reported by patients themselves in the follow-up patient interviews, is also discussed.

The first set of complications for which no occurrences were detected included:

- Hemorrhage
- Shock

- Cardiac arrest
- Aspiration
- Anaphylaxis
- Transfusion

A study of the medical records of all 882 patients in the sample revealed no occurrences of these complications for patients undergoing minor surgery in the four surgical settings.

The second group of complications were those for which a small number of occurrences were detected. These included the items showns in Exhibit IV-78. As can be seen, most of these complications occurred in very few instances. For a return to the recovery room or operating room, for example, 1% of the IP cases and none of the other cases experienced this complication. For cardiac arrythemia in the operative phase, 1% of the IP, 3.8% of the OP, none of the HAASC, and .2% of the FSASC cases experienced this complication. Only in the case of post-operative hypotension was there an occurrence rate of more than 1% in all surgical settings combined.

In general, there appeared to be little in the way of a systematic pattern of complications occurring more frequently in any one setting as shown in the exhibit. For some complications, the frequency seemed to be somewhat higher in the IP setting than in the others, but this was not consistant and was made up of relatively few cases. What can be stated is that, from the data on the six complications that had no occurrences and from the nine that had relatively few occurrences, the rate of occurrence of most of the complications was no greater in the FSASC setting than it was in the alternative surgical settings for patients included in the study. Only in the case of hypotension in the post-operative phase was the proportion of FSASC cases in which complications occurred substantially higher than for the other settings.

The last three complications considered were the presence of nausea, vomiting, and pain which occurred in a substantial proportion of surgical cases as shown in Exhibit IV-79. Post-operative nausea, for example, occurred in 14.3% of all cases, but 2.9% of IP, 7.0% of OP, 4.9% of HAASC, and 24.7% of FSASC cases. In interpreting these data it should be noted that the propensity of the personnel in the alternative surgical settings to record each of the complications may differ somewhat. This is especially important in the case of pain or

Exhibit IV-78

Occurrence of Nine Selected Complications in Surgical Procedures Performed Across Four Surgical Settings

Complication	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	Total N
urn to Recovery Room Required	1.0%	0.0%	0.0%	0.0%	0.1	882
urn to Operating Room Required	1.0	0.0	0.0	0.0	0.1	882
diac Arrythemia						
Operative	1.0	3.8	0.0	0.2	0.6	882
Post-Operative	0.0	0.0	0.0	0.0	0.0	873
Recuperative	0.0	0.0	0.0	0.0	0.0	870
inary Retention						
Operative	0.0	0.0	0.0	0.0	0.0	882
Post-Operative	1.0	0.0	0.0	0.0	0.1	873
Recuperative	1.0	0.0	0.0	0.0	0.1	870
normal Bleeding						
Operative	1.0	0.0	0.4	1.0	0.7	882
Post-Operative	1.0	0.0	0.0	0.5	0.3	873
Recuperative	0.0	0.0	0.0	0.0	0.0	870
potension						
Operative	0.0	1.3	0.0	0.0	0.1	882
Post-Operative	2.0	0.0	0.4	5.3	2.9	873
Recuperative	0.0	0.0	0.0	0.0	0.0	870
pertension						
Operative	0.0	0.0	0.0	0.2	0.1	882
Post-Operative	0.0	0.0	0.0	0.2	0.1	873
Recuperative	0.0	0.0	0.0	0.0	0.0	870
enito-urinary catheter	1.0	1.3	0.0	0.0	0.2	880
ntubation	2.9	1.3	0.0	0.0	0.5	881
otal n for each setting	n = 103	n = 78	n = 284	n = 417		882

Source: Medical Record Abstracts
and Patient Interviews

Exhibit IV-79

Occurrence of Three Selected Complications in Surgical Procedures Performed Across Four Surgical Settings

Complication	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	Total N
Nausea						
Operative	0.0%	0.0%	0.4%	0.0%	0.1%	882
Post-Operative	2.9	7.0	4.9	24.7	14.3	873
Recuperative	18.6	-	3.2	-	3.2	870
Vomiting						
Operative	0.0	0.0	0.0	0.5	0.2	882
Post-operative	3.9	5.6	5.7	20.4	12.5	872
Recuperative	14.7	-	3.5	-	2.9	870
Pain						
Operative	1.0	0.0	0.0	0.2	0.2	880
Post-operative	19.6	9.9	14.8	43.4	28.6	873
Recuperative	54.9	3.9	6.4	-	8.9	870
Total n for each setting	n = 103	n = 78	n = 284	n = 417		882

Source: Medical Record Abstracts
and Patient Interviews

nausea, where the convention of each facility as to what "severe" or "abnormal" may constitute may be different. As may be seen from the exhibit, the distributions of the complications appeared to be more similar for hospital-based surgical settings than for the FSASC setting. Furthermore, in the inpatient setting, the largest proportion of these minor complications appeared to occur in the in-facility recuperative phases since most were discharged to home from the recovery room. The longer the IP setting patients remained in the surgical facility, however, the more likely the minor complications of nausea, vomiting, and pain were to be noticed and recorded on the medical record.

Exhibit IV-80 displays data on complications occurring during the recuperative phase identified by patients during the patient interview. These data represent the number of problems reported by patients following surgery, not the number of patients; any one patient, therefore, could have mentioned more than one problem. The data in the exhibit seemed to show that there is relatively little difference across surgical settings in patients' reports of the incidence of post-surgical problems. For several problems, however, it appeared that the FSASC setting may have a slightly lower problem rate than the other settings. As an example, 49.3% of FSASC reports said that no recuperative problems were encountered, as compared with 38.7% of IP reports, 38.9% of OP reports, and 43.9% of HAASC reports. Similarly, 10.1% of the FSASC reports mentioned severe discomfort or problems, as compared with 20.9% of IP, 11.1% of OP, and 14.2% of HAASC reports. It would seem that a slightly larger proportion of FSASC surgeries resulted in no recuperative problems--as compared to the other surgical settings.

Summary of Findings. Based on the preceding analysis of complications reported for patients included in the sample, it was found:

- No incidence for six specific types of complications could be detected across the four surgical settings for patients included in the sample. These complications included hemorrhage, shock, cardiac arrest, aspiration, anaphylsis, and the need for transfusion.

Exhibit IV-80

Proportion of Reports of Problems During Recuperation by Surgical Patients

Specific Problem During Recuperation as Reported by Patient	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
No problems reported	38.7%	38.9%	43.9%	49.3%	50.4	290
Minor Discomfort/Problems*	25.8	33.3	27.6	27.5	27.7	176
Severe Discomfort/Problems**	20.9	11.1	14.2	10.1	12.7	81
Additional Surgery Required	0.0	0.0	1.6	1.0	1.1	7
Problem not corrected by surgery	0.0	2.8	1.2	0.3	0.8	5
Patient taken to Emergency Room or IP Facility	1.6	0.0	0.0	0.1	0.1	4
Specific reaction to anesthesia	0.0	8.3	1.2	1.7	1.7	11
Developed infection	3.2	2.8	2.5	1.0	1.9	12
	3.2	0.0	0.0	1.0	0.9	6
Lengthy/difficult recuperation	0.0	0.0	1.2	2.0	1.4	9
Inconvenienced/interruption of usual capabilities	6.4	2.8	4.6	5.0	4.8	31
Total reports, all types of problems	n = 62	n = 36	n=239	n=298		635

*e.g., minor bleeding, cramps, nausea, dizziness, fatigue

**e.g., heavy bleeding, difficulty breathing.

Source: Patient Interviews

- For nine complications that occurred with relatively low frequency in the surgical settings, the FSASC experienced a relatively higher proportion of patients with hypotension in the post-operative phase (5.3%) than did the other surgical settings.
- The FSASC setting experienced a relatively higher proportion of patients with nausea (24.7%), vomiting (20.4%) and pain (43.4%) in the post operative phase than did the IP setting or the OP and HAASC settings. However, the differences noted may be the result of the variation in medical information recording practices across surgical facilities.

Patient Disability

As a part of the after-surgery patient interview, patients were asked about the amount of time they spent in bed ("bed-days") and the amount of time during which they were prevented from performing their normal activities ("disability days"), both before and after their surgery.

Overall, patients reported an average .6 bed-days and 2.0 disability days prior to their surgery. This varied quite substantially by procedure, with tonsillectomy and adenoidectomy, myringotomy and adenoidectomy, and dilation and curettage being the procedures that occasioned the most disability before admission to the surgical facility.

The magnitude of disability varied within each procedure as well as across procedures. Apparently, most patients undergoing surgery had a relatively small degree of disability, while a few had a very substantial degree. This caused the variance of the disability measure for each procedure to be very large, relative to the mean number of disability days. The dilation and curettage procedure, for example, which had the largest number of cases, had an overall number of presurgery disability days of 3.2. The standard deviation, however, was 11.4, indicating a very substantial variance within the procedure. (Within each setting for the dilation and curettage procedure, the variance is equally high.) Other procedures had a similar distribution, with the standard deviation (for pre-surgery disability) being from 2 to 6 times the mean number of disability or bed-days. The large amount of variance observed in these data made it impossible to make reliable inferences about inter-setting differences in disability. The observed differences across settings were not found to be statistically significant.

Data concerning the number of bed-days and disability days after surgery also had a substantial variance, though not quite as large as with pre-surgery disability. Patients undergoing al procedures experienced an average of 2.0 bed-days and 6.4 disability days after surgery. Again, this varied considerably by procedure, with augmentation mammoplasty, ganglionectomy, and tonsillectomy and adenoidectomy experiencing the greatest amount of disability. With respect to post-surgery disability, no consistent pattern across surgical settings emerged. Although the variance of the post-surgery data was somewhat less than tha of the pre-surgery data, it was still large, at least equalling the mean value for almost every procedure. In this context, no systematic relationship of the settings to the disability data was evident.

An example of the post-surgery disability data is presented in Exhibit IV-81. The three procedures displayed in this exhibi were those for which the largest number of observations was made. As is shown, the standard deviation within each setting and across all settings was large. Further, there seemed to be no consistent pattern in the variation of the data. The myringtomy with adenoidectomy patients in OP and FSASC, for example, seemed to have experienced the least disability. For the dilation and curettage procedure, OP patients were well abov the mean, FSASC patients slightly above, and HAASC well below. For the laparoscopy with BTC procedure, IP and OP were approximately the same, with FSASC somewhat below and HAASC well below. This situation, in which no consistent pattern of variation can be detected, was illustrative of the other sets of disability data that were collected. As a result, it was not possible--on the basis of data concerning patient disability either before or after surgery--to make any inferences as to the relationship between the type of surgical setting and the extent or amount of patient disability.

Exhibit IV-81

Post-Surgery Disability-Days Experienced by Patients Undergoing Selected Procedures

rocedure	Setting												All Settings		
	Inpatient			Outpatient			HAASC			FSASC			$\bar{x}$	σ	n
	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n	$\bar{x}$	σ	n			
yringotomy and Adenoidectomy	4.7	6.3	10	1.0	1.0	3	3.6	4.8	27	0.9	1.5	22	2.7	4.3	62
ilation and Curettage	7.1	6.7	12	10.2	14.1	10	2.3	4.1	50	5.6	15.4	46	4.7	11.1	118
aparoscopy with BTC	7.0	0.0	1	7.7	11.6	9	3.0	2.4	30	4.3	7.4	44	4.2	6.7	84

Source: Patient Interviews

Summary of Findings.

- No systematic differences between surgical settings in either the number of bed days or disability days after surgery could be detected because of the relatively large variance in the number of days compared with the mean. Therefore, there is no evidence to indicate that the patients treated in ambulatory surgical settings require more (or less) recuperative time than patients in the IP setting.

Patient Satisfaction With Surgical Episode

This section deals with the dimensions of patient satisfaction with the surgical episode. It is taken from data collected from 584 patients in the sample who could be contacted and consented to be interviewed after their surgery. This section is organized into the following main discussions:

- General satisfaction with the surgical episode
- Importance of the surgery to the patient
- Specific elements of patient satisfaction
- Factors important in selecting a surgical setting
- Attitudes toward home care after surgery.

General Satisfaction With Results of Surgery

Overall, patients interviewed after their surgery reported being quite satisfied with the results of the procedure. Exhibit IV-82 shows the responses of patients as to whether they were very satisfied, somewhat satisfied, slightly satisfied, or not satisfied with the results of the surgery. As is shown, patients overall showed a high degree of satisfaction, with relatively little difference across surgical settings. Patients who were very satisfied, for example, constituted 85.5% of IP, 78.1% of OP, 84.7% of HAASC, and 86.8% of FSASC. Similarly, those who were dissatisfied were 3.6% of IP, 3.1% of OP, 5.0% of HAASC, and 3.0% of FSASC.

Exhibit IV-82

Level of General Patient Satisfaction with Results of Surgery, Across Surgical Settings

Proportion of Patients in Each Satisfaction Interval

Level of General Satisfaction	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
Very Satisfied	85.5%	78.1%	84.7%	86.8%	85.4%	490
Somewhat Satisfied	7.3	18.8	9.0	7.2	8.5	49
Slightly Satisfied	3.6	0.0	1.4	3.0	2.3	13
Not Satisfied	3.6	3.1	5.0	3.0	3.8	22
Total, all levels of Satisfaction	n = 55	n = 32	n = 222	n=265	100.0%	574

Note: Ten patients responding to the Patient Interview questionnaire did not answer this question.

Source: Patient Interviews

The salient finding from the responses to this question was that patients overall appeared to be highly satisfied with the results of their surgery. This finding was relatively constant across surgical settings; while patients apparently seemed slightly less satisfied with the OP setting, this is not accompanied by any increase in the proportion of slightly satisfied patients or dissatisfied patients. Further, the difference between OP and the other settings in the "very satisfied" category was not found to be statistically significant.

A further measure of patient satisfaction investigated in the patient interview was the patient's evaluation of the surgical episode compared with a previous surgery. For this question, 331 of the 585 undergoing the present surgery responded concerning past surgery. (It can be presumed that nearly all of the others may not have had any previous surgery.) As in the previous measures of patient satisfaction, the HAASC and FSASC settings appeared to have produced a somewhat higher level of patient satisfaction as compared to the IP and OP settings on this measure of satisfaction. These data are shown in Exhibit IV-83.

Importance of Surgery. Two questions were asked in the Patient Interview to attempt to determine the importance or urgency of the surgery to patients. The first asked patients to assess the importance of their surgery. While it was not expected that a high proportion of patients would reply that their surgery was "unimportant," it was considered possible that some systematic difference across settings in surgeries designated "very important" might emerge. The second question dealing with this subject asked patients whether they would have considered delaying the surgery if the scheduled time had become inconvenient. Data presenting the responses to these questions are presented in Exhibits IV-84, IV-85, and IV-86.

Exhibit IV-84 shows the proportion of patients in each surgical setting rating the surgery at each of the four levels of importance. As is shown, 84.7% of the patients rated their surgery as "very important" overall, with most of the remainder rating it as "somewhat important." There seemed to be little difference between the four settings, with 86.0% of IP patients

Exhibit IV-83

Level of Patient Satisfaction with Surgical Episode Compared with Previous Surgery

Level of Satisfaction with Present Surgery	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
ch more satisfied	37.0%	26.3%	53.5%	47.5%	47.7%	158
mewhat satisfied	3.7	10.5	8.7	8.2	8.2	27
me	44.4	57.9	33.1	39.2	38.4	127
mewhat less satisfied	7.4	0.0	2.4	2.5	2.7	9
ch less satisfied	7.4	5.3	2.4	2.5	3.0	10
tal n, all levels of satisfaction	n = 27	n = 19	n = 129	n=158	100.0%	331

ote: 253 patients responding to the Patient Interview questionnaire did not answer this question.

Source: Patient Interviews

Exhibit IV-84

Importance to Patient of Having Surgery Performed (All Procedures)

Level of Importance	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	TOTAL n
Very Important	86.0%	88.2%	84.5%	84.0%	84.7	491
Somewhat Important	8.8	8.8	11.8	12.3	11.6	67
Slightly Important	3.5	2.9	2.3	1.9	2.2	13
Not Important	1.8	0.0	1.4	1.9	1.6	9
TOTAL, All Levels of Importance	n=57	n=34	n=220	n=269	100.0	580

Note: Four patients responding to the Patient Interview questionnaire did not answer this question.

Source: Patient
Interview
Questionnaires

rating their surgery as very important, 88.2% of OP patients, 84.5% of HAASC patients, and 84.0% of FSASC patients. (Differences among the twelve procedures are reviewed in a subsequent section.)

Exhibit IV-85 shows the proportion of patients that would have considered delaying their procedure if the scheduled time had become inconvenient. As is shown, these data vary considerably by setting, with the IP and HAASC patients considerably less likely to delay than the OP and FSASC patients.

The FSASC and HAASC results reflect the apparent minor or elective nature of the surgical procedures included in the study. Because of the patient conditions including seriousness of the procedure and risk that would indicate an inpatient admission, it is understandable that a delay for patients having surgery in the IP setting might be less acceptable.

Exhibit IV-86 examines the data in the previous tables in a different way, i.e., it ranks each of the twelve procedures by the importance rating developed in the previous two tables. For example, the first procedure, myringotomy and adenoidectomy was shown to rank next-to-last (eleventh) using both measures of importance. Examining the comparative rankings shown in the exhibit, there appears to be substantial coincidence in the distribution of the two importance measures across procedures. Only in three cases (vasectomy, laparoscopy with BTC, and excision of lipoma or cyst) do the ratings diverge to any appreciable extent.

What these rankings appear to indicate is that patients undergoing inguinal herniorrhaphy and tonsillectomy and adenoidectomy considered these procedures to be of greater importance than did patients undergoing other procedures. Procedures that are considered to be less important included vasectomy and excision of lipoma or cyst.

Elements of Patient Satisfaction. Other measures of overall patient satisfaction included a set of thirteen patient responses--rated on a scale of from 1 to 5 for each response--of satisfaction with various aspects of the surgical process. These aspects include the following:

Exhibit IV-85

Proportion of Patients That Would Have Considered Delaying Procedure If the Scheduled Time Had Become Inconvenient (All Procedures)

Would Patient Have Considered Delaying Procedures	Setting				All Settings	
	IP	OP	HAASC	FSASC	%	n
Yes	37.5%	61.8%	48.6%	60.3%	53.7	311
No	62.5	38.2	51.4	39.7	46.3	268
TOTAL	n=56	n=34	n=222	n=267	100.0	579

Note: Five patients responding to the Patient Interview questionnaire did not answer this question.

Source: Patient Interview Questionnaires

Exhibit IV-86

Relative Importance Ranking of Procedures as Reported by Surgical Patients

Procedure	Procedure rank based on proportion reporting surgery as "very important" (highest ranked first)	Procedure rank based proportion that would have delayed surgery (lowest ranked first)
yringotomy (with tubes) and denoidectomy	2	2
onsillectomy and denoidectomy	4	4
ilation and Curettage	8	6
aparoscopy with Tubal oagulation	6	11
xcision of Breast Mass	5	3
xcision of Ganglion	11	10
Inguinal Herniorrhaphy	1	1
asectomy	9	12
Circumcision	10	9
Aumentation Mammoplasty	7	8
Eye Muscle Operation	3	5
Excision of Lipoma or Sebaceous Cyst	12	7

Source: Patient Interviews

- Access to facility (e.g., very easy to very difficult)
- Friendliness of nurses and staff (e.g., very unfriendly to very friendly)
- Quality of care
- Attention to patient needs
- Waiting time
- Physical environment
- Pain and discomfort after surgery
- Friendliness of doctor
- Anesthesiologist fee
- Surgeon fee
- Facility fee
- Patient confidence in the surgeon
- Patient confidence in the anesthesiologist

The following sections present a discussion of an overall index combining the thirteen responses and a review of several of the individual responses.

Overall Index of Patient Satisfaction - Exhibit IV-87 shows the distribution of values of an index that additively combines the thirteen responses. Thus the highest value attainable would be 65 (a score of five for each of the thirteen), and the lowest would be 13. The frequency intervals for the index were developed by using a scatter diagram of the responses to group those constituting the most natural clusters and delineating the corresponding breaking points.

As is shown in the exhibit, the vast majority of surgical patients across all settings were highly satisfied with their experience. Over 9% of the combined scores were greater than 60, and 70.7% were between 50 and 59. These scores were

Exhibit IV-87

Overall Index of Patient Satisfaction with Surgery Performed in Four Alternative Settings

Proportion [illegible] Each [illegible] on Interval

Overall Patient Satisfaction Index	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
- 49	37.3%	43.9%	16.3%	15.7%	20.0%	116
50 - 59	59.1	47.4	75.3	73.0	70.7	414
60 +	3.6	8.7	8.4	11.2	9.3	54
Total n, all index values	n = 57	n = 34	n = 223	n=270	100.0%	584
Mean satisfaction index score	$\bar{x}$ = 49.5	$\bar{x}$ = 49.4	$\bar{x}$=53.7	$\bar{x}$=54.1	$\bar{x}$ = 53.22	

Scale:

13 very dissatisfied

65 very satisfied

There were 13 patient satisfaction questions, each of which could be scored from 1 to 5. Thus the overall range was from 13 to 65.

Source: Patient Interviews

relatively high and show a substantial overall level of satisfaction with the surgical process.

Across surgical settings, however, there was some variation in patient responses. The FSASC setting seemed to have the highest level of satisfaction, followed closely by the HAASC. The pattern of variation across index scores for these two ambulatory settings seems similar. The IP and OP settings, on the other hand, have a distinctly lower level of patient satisfaction. The IP and OP settings, for example, had 37.3% and 43.9% respectively of patients responses at 49 or lower, compared to 16.3% and 15.7% for HAASC and FSASC settings respectively. Both IP and OP settings were also lower than the others in the middle range of 50 to 59.

From an examination of the index of patient responses, we may conclude that patients exhibited a significantly higher level of satisfaction (and corresponding lower level of dissatisfaction) with the FSASC and HAASC settings as compared to the IP and OP settings.

Individual Elements of Patient Satisfaction - Among the thirteen individual elements of patient satisfaction addressed in the interviews, there was also a substantial range of variation across surgical settings. Highlights of this variation among the individual elements included the following:

- 66.7% of the IP cases and 58.8% of the OP cases considered the facility staff to be very friendly, but 83.4% and 82.2% of the HAASC and FSASC facilities expressed this view.
- 49.1% of the IP and 50.0% of the OP cases felt that much attention was given to patient needs as compared to 83.0% of the HAASC and 83.6% of the FSASC patients
- 59.6% and 44.1% of the IP and OP patients felt that the facility's physical environment was pleasant, however, 78.5% of the HAASC and 71.4% of the FSASC patients expressed this opinion.
- 57.9% and 58.8% of the IP and OP patients thought that their quality of care was good, as compared to 83.4% of the HAASC and 87.0.% of the FSASC patients.

- 39.5% of the IP patients, 11.1% of the OP patients, 3.3% of the HAASC patients, and 3.1% of the FSASC patients considered the facility fee very expensive

These data indicated that the procedures performed in the HAASC and FSASC settings generated considerably greater patient satisfaction than those performed in the IP and OP settings. With respect to perceived quality of care, perceived facility expense, and important aspects of patient-facility contact, there was substantially greater satisfaction expressed with the HAASC and FSASC settings.

As might have been expected, on a number of elements of patient satisfaction investigated there was relatively little variation across settings. Patients' confidence in their surgeon, for example, was relatively unchanged across settings: 80.4% in IP, 81.8% in OP, 85.2% in HAASC, and 88.8% in FSASC. Other elements in this category include surgeons' and anesthesiologists' fees, friendliness of the doctor, amount of post-operative pain, and ease of facility access.

Finally, in the case of three elements of patient satisfaction, inconsistent and/or anomalous results were obtained. For patient waiting time, 15.8% of the IP patients, 14.7% of OP, 2.2% of HAASC, and 3.3% of FSASC patients reported a lot of waiting. However, 43.9% of IP, 35.3% of OP, 40.8% of HAASC, and 23.8% of FSASC patients reported no waiting. Also, 61.9% of IP, 51.9% of OP, 56.6% of HAASC, and 73.4% of FSASC patients expressed much confidence in the anesthesiologist.

Specific Patient Feelings Toward Surgical-Episode - In the Patient Interview an open-ended question was asked that allowed patients to record their feelings, positive and negative, toward the surgical episode that they had undergone. Responses were then coded into a number of discrete categories, such as "general positive feeling," "positive feeling toward facility process," and so on. These responses are presented in Exhibit IV-88.

The data presented in the exhibit show that a substantial majority of the 995 comments expressed by patients were positive ones. However, a considerably smaller proportion of

Exhibit IV-88

Feelings Reported by Patients Regarding Surgical Episode

Proportion of Comments of Designated Description by Patients in Each Setting

Patient Feelings Toward Surgical Episode	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
Positve Feelings: Total	71.2%	54.0%	78.6%	82.0%	77.1%	767
General positive feeling	31.9	30.6	35.2	35.0	33.1	330
Better than alternative settings	0.0	0.0	2.2	1.7	1.6	16
No in-hospital recuperation required	0.0	0.0	1.1	2.3	1.5	15
Positive feeling toward doctor	3.2	6.6	4.1	3.8	4.0	40
Positive feeling toward facility process	5.3	1.6	5.2	9.5	7.0	70
Positive feeling toward facility staff	10.6	6.6	14.3	18.5	15.5	154
Positive result from procedure	18.1	6.6	15.1	9.9	12.4	123
Other positive feelings	2.1	8.0	1.4	1.3	1.3	19
Negative Feelings: Total	28.6	45.8	22.6	19.2	22.9	228
General negative feeling	4.2	4.9	3.6	1.1	2.5	25
Negative feeling toward facility process	10.6	18.0	5.5	7.6	7.7	77
Negative reaction to medication	3.2	1.6	3.3	2.5	2.8	28
Other negative feelings	10.6	21.3	10.2	8.0	9.8	98
Total, All Reports	94	49	360	463		995

OP patients, 54.0%, made positive comments as opposed to the other settings, which were 71.2%, 78.6%, and 82.0% respectively for IP, HAASC and FSASC. Aside from the somewhat larger proportion of negative comments in the OP setting, patients expressed a higher proportion of negative comments (as compared to other settings) toward the OP facility process, and a higher proportion of positive feelings toward the FSASC facility staff.

Factors Important in Selecting A Surgical Facility. Patients ere also asked what factors, from a list of eighteen, were most mportant to them in selecting a facility for surgery. The actors presented included such items as cost of surgery, amount f time involved, insurance coverage, etc. The potential range f responses varied from 1, very important, to 4, not important t all, and are displayed in Exhibit IV-89. Each of the factors isted is ranked by setting, and the mean rating score for each etting and overall is presented. For example, across all ettings, facility cleanliness, service quality, physician ualifications, facility staff, and physician attitudes seemed to e the most important factors in influencing facility selection.

The most salient finding shown in the exhibit is that there was relatively little difference across surgical settings in those factors designated as important in influencing facility selection. In fact, among the factors rated as the five most important, three of the four settings listed the identical factors (in a slightly different order across settings) and the fourth listed four of the top five. Evidently, those factors held to be important in selecting a facility were very similar for patients undergoing procedures in different settings.

For the case of one factor, there appears to be a slight variation across settings. This is with respect to need for follow-up visit, which is ranked tenth by IP patients, but thirteenth by OP patients, twelfth by HAASC patients, and fourteenth by FSASC patients. This attitude was anticipated, since inpatients while in the hospital can receive follow-up visits from doctors with minimal inconvenience, while all the ambulatory patients must make a greater effort to receive post-operative care.

Exhibit IV-89

Patients' Assessment of Factors Important in Selecting a Facility for Surgery

FACTOR RANK	SETTING									
	IP		OP		HAASC		FSASC		Total-All Settings	
	Factor	Rating	Factor	Rating	Factor	Rating	Factor	Rating	Factor	Rating
1	Service Quality	1.02	Facility Cleanliness	1.03	Service Quality	1.05	Facility Cleanliness	1.07	Facility Cleanliness	1.06
2	Physician Qualifications	1.07	Physician Qualifications	1.03	Facility Cleanliness	1.05	Service Quality	1.09	Service Quality	1.07
3	Concern with Results	1.07	Service Quality	1.12	Physician Qualifications	1.05	Facility Staff	1.16	Physician Qualifications	1.12
4	Facility Cleanliness	1.11	Physician Attitudes	1.18	Facility Staff	1.23	Physician Qualifications	1.18	Facility Staff	1.19
5	Facility Staff	1.12	Facility Staff	1.21	Physician Attitudes	1.24	Physician Attitudes	1.29	Physician Attitudes	1.25
6	Physician Attitudes	1.16	Concern with Results	1.27	Physician Availability	1.35	Physician Availability	1.44	Concern with Results	1.28
7	Physician Availability	1.36	Physician Availability	1.49	Concern with Results	1.37	Concern With Results	1.47	Physician Availability	1.40
8	Insurance Coverage	1.77	Patient Privacy	1.77	Insurance Coverage	1.63	Insurance Coverage	1.70	Insurance Coverage	1.69
9	Patient Privacy	1.86	Insurance Coverage	1.91	Patient Privacy	2.06	Facility Appearance	1.94	Facility Appearance	2.00
10	Need for Follow-up Visit	1.93	Facility Appearance	2.06	Facility Appearance	2.08	Convenience	2.12	Patient Privacy	2.09
11	Facility Appearance	1.93	Family Responsibility	2.19	Convenience	2.09	Family Responsibility	2.21	Convenience	2.13
12	Family Responsibility	2.03	Convenience	2.29	Need for Follow-Up Visit	2.28	Amount of Time	2.21	Family Responsibility	2.23
13	Convenience	2.25	Need for Follow-Up Visit	2.34	Family Resposibility	2.30	Patient Privacy	2.22	Need for Follow-Up Visits	2.30
14	Transportation and Parking	2.50	Cost	2.38	Amount of Time	2.37	Need for Follow-Up Visit	2.39	Amount of Time	2.33
15	Facility Location	2.53	Facility Location	2.47	Facility Location	2.40	Cost	2.45	Cost	2.47
16	Cost	2.54	Amount of Time	2.55	Cost	2.50	Facility Location	2.61	Facility Location	2.51
17	Amount of Time	2.66	Income Loss	2.71	Income Loss	2.65	Income Loss	2.68	Income Loss	2.68
18	Income Loss	2.80	Transportation and Parking	2.74	Transportation and Parking	2.69	Transportation and Parking	2.79	Transportation and Parking	2.72
	n = 57		n = 34		n = 222		n = 268		n = 581	

Source: Patient Interview and Questionnaire

Scores:
1 = Very Important
2 = Somewhat Important
3 = Slightly Important
4 = Not Important at All

It may also be seen that the factors of transportation and parking, income loss, facility location, and procedure cost were perceived to be relatively unimportant by patients in influencing the choice of a surgical setting. From the responses, patients appeared not to take these factors into significant account. Patients were more concerned with the perceived attributes of quality, facility cleanliness, and the characteristics and attitudes of their physician.

Patient Selection of Facility and Anesthesia. Another area of inquiry was whether patients were offered a choice as to the facility in which to have the procedure performed and also what type of anesthetic (general, regional, or local) would be used. Data summarizing patients' responses are presented in Exhibits IV-90 and IV-91.

These data show that there appeared to be a moderate difference in the proportion of patients who were given a choice of surgical facility across the various settings, with FSASC patients more often given a choice. For FSASC patients, 42.0% were given a choice, compared with 36.7% for HAASC, 26.5% for OP, and 35.1% for IP. Using the Z test, the IP-FSASC HAASC-FSASC differences are not significant ($p \leq .10$), while the OP-FSASC difference is significant at that level. Thus it appeared that FSASC patients were somewhat more likely to have been given a choice of facility than were patients undergoing surgery in other settings, but this difference is more pronounced for the OP setting than it was for the others.

The next exhibit shows the proportion of patients who were offered a choice of anesthesia type (either general, regional, or local) across the four surgical settings. In this case, the differences are more significant. For example, 14.1% of FSASC patients were offered a choice, as compared to 9.0% of HAASC, 2.9% of OP, and 5.3% of IP. All of these differences were found to be significant ($p \leq .10$). Thus, it appeared that there is a substantial difference across settings in the proportion of patients offered a choice of anesthesia type. While the number of individuals offered this choice was not large in an absolute sense--only 10.7% of patients across all settings-- it was much more prevalent in the FSASC setting as compared to the alternative surgical settings.

Finally, Exhibit IV-92 shows the proportion of patients who would select the same surgical facility if their surgery decision were to be made again. As can be seen from the distribution

Exhibit IV-90

Proportion of Patients Who Were Given a Choice of Surgical Facility

Patients Given Choice of Facility	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
Given Choice	35.1%	26.5%	36.7%	42.0%	38.4%	223
Not Given Choice	64.9	75.3	63.3	58.0	61.6	358
Total patients, all categories	n = 57	n = 34	n = 221	n=269	100.0%	581

Source: Patient Interviews

Exhibit IV-91

Proportion of Patients Who Were Given a Choice of Anesthesia for Their Surgical Procedure

Patients Given Anesthesia Choice	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
Yes	5.3%	2.9%	9.0%	14.1%	10.7%	62
No	91.2	94.1	89.6	84.4	87.6	510
Don't Know	3.5	2.9	1.4	1.5	1.7	10
Total, all categories	n = 57	n = 34	n = 221	n=270	100.0%	582

Source: Patient Interviews

Exhibit IV-92

Proportion of Patients who Would Choose the Same or a Different Surgical Facility if Their Surgery Decision were Being Made Again

If Decision for Surgery Made Again, Which Facility Would be Chosen	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
Same Facility	84.2%	82.4%	96.0%	94.8%	93.5%	546
Other Facility	8.8	14.7	2.2	4.4	4.6	27
Don't Know	7.0	2.9	1.8	0.7	1.9	11
Total, all Facilities	n = 57	n = 34	n = 223	n=270	100.0%	584

Source: Patient Interviews

ere appeared to be a slightly greater tendency for patients aving surgery in the HAASC and FSASC setting to indicate a reference for these settings than for patients in either the IP r OP settings. Over ninety percent of the HAASC and FSASC atients reported they would select the facilities a second ime. The OP setting had the smallest proportion of patients who eported they would select the setting if the decision were to be ade again.

Need for Home Care After Surgery. An issue in the selection f the appropriate setting for minor surgery is the availability f someone to assist the patient during the at-home portion of he recuperative phase. As shown in Exhibit IV-93, the patients n the sample having surgery performed in the ambulatory settings ere somewhat more likely to have someone at home to help during ecovery than were patients who had surgery in the inpatient etting. Although the home help was more available for mbulatory patients, the help was perceived as less important to hose patients than to patients from the inpatient setting. xhibit IV-94 shows that 80.4% of the inpatients thought that ome help was very important after surgery as compared to only 3.3% of the OP setting patients, 66.5% of the HAASC patients and 3.3% of the FSASC patients. To some extent, the perceived need or home help coupled with the apparent reduced availability of uch help for patients having minor surgery in the inpatient etting may have contributed to the selection of the inpatient etting for these patients. It should be recalled that hysicians who responded to the questionnaire when asked under hat conditions minor surgery should be done in an inpatient etting mentioned home care considerations. Although this was ot a frequent response, it was mentioned for eight of the twelve rocedures included in the study.

Summary of Findings. Based on the analysis of patient atisfaction with the surgical episode, it was found:

- Very little difference was detected in the overall level of patient satisfaction with the IP, HAASC, and FSASC surgical setting with 85.5%, 84.7% and 86.8% of the patients in the setting respectively indicating they were overall very satisfied with the care received. Of the proportion of positive comments made about a surgical setting, the FSASC elicited the largest percentage of such comments with 82.0% compared with 78.6% for the HAASC, 71.2% for IP and 54.0% for OP.

Exhibit IV-93

Proportion of Surgical Patients who had Someone at Home to Help While They Recovered

Was Help Available?	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
Yes	77.2%	85.3%	81.6%	82.2%	81.7%	477
No	22.8	14.7	18.4	17.8	18.3	107
Total	n = 57	n = 34	n = 223	n=270	100.0%	584

Source: Patient Interviews

Exhibit IV-94

Patients' Perceptions of Importance of Home Help After Surgery

Importance of Someone at Home to Help	Setting				All Settings	
	Inpatient	Outpatient	HAASC	FSASC	%	N
Very Important	80.4%	63.3%	66.5%	63.3%	66.1%	322
Somewhat Important	6.5	16.7	15.1	15.9	14.8	72
Slightly Important	6.5	6.7	9.2	7.5	8.0	39
Not Important	6.5	13.3	7.6	11.9	9.9	48
Total n, all categories	n = 46	n = 30	n=185	n=226	100.0%	487

Source: Patient Interviews

- A smaller proportion of patients reported being very satisfied with the OP setting (78.1%) as compared to the alternative settings. Similarly a greater percentage of negative comments were elicited from the OP setting patients (45.8%) than for any other setting.

- A larger proportion of patients in the ambulatory setting than in the IP setting would have considered delaying the procedure if the scheduled time for surgery had become inconvenient. It may be concluded that for the patients in the ambulatory settings the timing of the surgery was not considered as critical as for patients in the IP setting.

- Based on an index of thirteen satisfaction factors, the HAASC and FSASC settings were considered more satisfactory than were the traditional IP and OP settings. 37.3% of the IP and 43.9% of the OP setting patients scored these settings below 50 on the 13 to 65 scale as compared to only 16.3% and 15.7% of the patients in the HAASC and FSASC settings.

- Four factors were consistantly rated higher for a larger proportion of patients in the HAASC and FSASC settings than in the OP and IP settings. These factors were: Friendliness of facility staff; attention to patient needs; pleasantness of physical environment; and general quality of care.

- In selecting a surgical setting, five factors appeared to be the most important to the patients in the sample: Facility cleanliness, service quality, physician's qualifications, facility staff, and physician's attitudes. There was little variation among settings in the relative importantance of these factors.

- Conversely, five factors also seemed to be relatively unimportant in the selection of a surgical setting as perceived by the patient: transportation and parking, income loss, facility location, cost of the surgery, and the amount of time required. Again little variation was observed in the relative unimportance of those factors.

- A larger proportion of patients who had surgery in the HAASC (96.0%) and the FSASC (94.8%) would choose the same surgical setting again than compared to the IP (84.2%) and OP settings (82.4%).

- The importance of home care assistance after surgery was perceived as more important to patients in the IP setting (80.4% responded it was very important) than to patients in the ambulatory settings (63.3% for OP, 66.5% for HAASC, and 63.3% for FSASC patients). However, home care help was generally more available for patients who had surgery in ambulatory settings than for patients in IP settings.

Physician Satisfaction With Surgical Settings

When asked to list the most important factors that influence the level of physician satisfaction with a surgical setting in order of importance, the characteristics of the surgical facility staff and the physical characteristics of the facility were reported as the dominant factors. Exhibit IV-95 on the following page presents the distribution of responses to this open-ended question obtained from the sample of Maricopa County physicians who responded to the mail questionnaire. Characteristics of the staff and the physical aspects of the facility together accounted for 48.5% of the total responses. Of lesser importance were convenience to the physician and the efficiency of the facility with 13.2% and 12.4% of the responses respectively. Facility cost and attributes of the patient care process were apparently somewhat important as factors with 8.6% and 8.0% respectively.

Satisfaction and Convenience Ratings of Surgical Settings. Based on the factors the physician felt were the most important, each of the five types of surgical settings were rated for overall satisfaction with the setting for minor surgery on a one-to-five scale ranging from very satisfied (1) to very dissatisfied (5). The results of the ratings are given in Exhibit IV-96. As is shown, a substantially higher proportion of physicians expressed very high satisfaction with the FSASC setting as compared to the others. Almost three-quarters of the physicians expressed high satisfaction with the FSASC, as compared to 52.5% for the IP setting, only 26.6% for OP, 41.5% for HAASC, and 48.4% for the physician's office. The mean satisfaction scores were 1.51 for FSASC, 1.89 for IP, 2.39 for OP, 2.04 for HAASC, and 2.03 for the physician's office. The

Exhibit IV-95

Most Important Factors that Determine Physician Satisfaction with a Surgical Setting as Reported by a Sample of Maricopa County Physicians

FACTOR	NUMBER OF MENTIONS	%
Facility Staff	163	25.0%
Facility Physical Characteristics	153	23.5
Convenience	86	13.2
Facility Efficiency	81	12.4
Cost	56	8.6
Patient Care Process	52	8.0
Patient Attitude	23	3.5
Administration	19	2.9
Insurance	2	0.3
Other	16	2.6
TOTAL	651	100.0%

Source: Physician Questionnaires

Exhibit IV-96

Physicians Rating of Overall Satisfaction With Five Surgical Settings

SATISFACTION LEVEL	SETTING									
	IP		OP		HAASC		FSASC		PHYSICIAN OFFICE	
	N	%	N	%	N	%	N	%	N	%
1. Very Satisfied	93	52.5	44	26.6	44	41.5	87	74.4	77	48.4
2. Somewhat Satisfied	43	24.3	59	35.6	31	29.2	12	10.3	41	25.8
3. Neutral	17	9.6	26	15.7	19	17.9	11	9.4	15	9.4
4. Somewhat Dissatisfied	16	9.0	28	16.9	7	6.6	2	1.7	12	7.5
5. Very Dissatisfied	8	4.5	9	5.4	5	4.7	5	4.3	14	8.8
TOTAL	177	99.9%	166	100.2%	106	99.9%	117	100.1%	159	99.9%
Average Rating	1.89		2.39		2.04		1.51		2.03	

Source: Physician Questionnaires

proportion of physicians who were very dissatisfied with each setting was relatively small and varied from 4.3% for the FSASC to 8.0% for the physician's office. It should be noted that very few responses reflected severe dissatisfaction with any of the surgical settings. For all settings over 70% of the respondents were very satisfied or somewhat satisfied with the surgical setting. The hospital outpatient setting was apparently the least satisfactory of the five surgical settings--16.9% of the respondents were somewhat dissatisfied with that setting and only 26.6% were very satisfied.

Similarly, physicians were also asked to rate each of the surgical settings for convenience to the surgeon for minor surgery on the same scale. These ratings are presented in Exhibit IV-97 and show the physicians office setting as the most convenient surgical setting from the surgeons persective with 87.2% reporting it as very convenient. The FSASC setting with 53.3% of the physicians rating it as very convenient and 24.1% as somewhat convenient achieved the highest rating of the institutionally based surgical settings. The OP setting was rated as the least convenient for the surgeon with only 27.3% reporting it as very convenient setting and 26.1% rating the OP setting as either somewhat inconvenient or very inconvenient. Of the hospital based settings the IP and HAASC settings were seen as more convenient than the OP settings for minor surgery.

Physician's Perceptions of the Advantages and Disadvantages of the FSASC and Hospital Settings for Minor Surgery. In the physician questionnaire, physicians were also asked to state the most significant advantages and disadvantages that they perceived in the FSASC versus hospital settings. These open-ended responses were then coded into general and specific categories of response, and are shown in Exhibits IV-98 through IV-101 on the following pages. (It should be noted that the specific categories have been collapsed to form general categories in the top parts of the exhibits.) Although many of the advantages and disadvantages cited by the physicians in the questionnaire were aspects of process as opposed to structural quality, all responses are presented here for the sake of completeness and so that the reader can gain an overall impression of the perceptions of the respondents.

Significantly, the exhibits show that 269 mentions were directed at FSASC advantages, as opposed to 108 for FSASC

Exhibit IV-97

Physicians Rating of The Convenience of Five Surgical Settings

CONVENIENCE LEVEL	SETTING									
	IP		OP		HAASC		FSASC		PHYSICIAN OFFICE	
	N	%	N	%	N	%	N	%	N	%
1. Very Convenient	72	40.4	47	27.3	44	35.2	73	53.3	123	87.2
2. Somewhat convenient	41	23.0	51	29.7	43	34.4	33	24.1	13	9.2
3. Neutral	25	14.0	29	16.9	14	11.2	12	8.8	10	7.1
4. Somewhat Inconvenient	24	13.5	35	20.3	15	12.0	4	2.9	6	4.3
5. Very Inconvenient	16	9.0	10	5.8	9	7.2	15	10.9	9	6.4
Average Rating of Convenience	178	99.9%	172	100.0%	125	100.0%	137	100.0%	141	100.2%
Standard Deviation	2.19		2.48		2.22		1.94		1.76	

Source: Physician Questionnaires

disadvantages, 156 for hospital advantages, and 170 for hospital disadvantages.

Exhibit IV-98 shows that cost and facility efficiency were the two advantages of the FSASC most often cited by the physicians, with 26.0% and 20.8% of the responses, respectively. The two factors cited as the most important determinants of physician satisfaction, facility staffing and facility physical characteristics, were mentioned in 8.9% and 4.8% of the responses respectively.

Structural aspects of staffing and facility physical characteristics of the FSASC were apparently less important in terms of perceived advantages than were the other principal characteristics of cost, efficiency and convenience.

Exhibit IV-99 shows that inconvenience, inadequate patient care process, and the lack of backup facilities for serious complications were the primary disadvantages physicians perceived in the FSASC surgical setting. Although these were cited in relatively few cases, 16.7% of the mentions stated that the FSASC offered inadequate facilities or equipment, especially in case of serious complications.

With respect to the advantages of the hospital as a setting for minor surgery, shown in Exhibit IV-100, 37.8% of the responses cited the nature of the patient care process, 23.7% of the physical characteristics of the facility and 13.5% the facility staffing. Interestingly all of the most frequently mentioned advantages of hospital settings were structural characteristics. Among specific responses, 25.0% cited the availability of emergency care, and others mentioned the availability of equipment and instruments.

Exhibit IV-101 shows the perceived disadvantages of the hospital as a setting for minor surgery. The major disadvantages reported were excessive cost and inefficiency.

Summary of Findings. With respect to the physicians reported satisfaction with alternative surgical settings it was found:

- The most important factors as reported in the physician questionnaire that appear to determine the level of physician satisfaction with a surgical setting are:

Exhibit IV-98

Advantages of the FSASC for Minor Surgery
General Categories of Response

Advantage	N	%
Cost	70	26.0
Facility Efficiency	56	20.8
Convenience	43	16.0
Nature of Patient Care Process	27	10.0
Administration	25	9.3
Facility Staffing	24	8.9
Facility Physical Characteristics	13	4.8
Patient Attitude	10	3.7
Insurance	1	0.4
Total	269[1]	99.0

Specific Categories of Response[2]

Advantage	N	%
Cost (unspecified)	45	16.7
Efficiency (unspecified)	22	8.2
Cost to Patient	21	7.8
Access/Convenience (unspecified)	19	7.1
Ease of Scheduling	14	5.2
Lack of Paper Work	12	4.5
Quality & Availability of Anesthesiology	10	3.7
All others	126	46.8
Total	269	100.0

[1] 9 additional respondents stated that there were no advantages.

[2] 137 physicians responded to this question, including those noted in footnote 1.

Source: Physician Questionnaires

Exhibit IV-99

Disadvantages of the FSASC as a Setting For Minor Surgery

Disadvantage	N	%
Inconvenience	33	30.6
Inadequate Patient Care Process	32	29.6
Inefficiency	13	12.0
Inadequate Staffing	9	8.3
Inadequate Physical Characteristics	7	6.5
Excessive Cost	7	6.5
Malpractice Liability	2	1.9
Administrative Inadequacy	2	1.9
Prefer to Support Hospital	2	1.9
Requires Home Care Commitment	1	0.9
Total	108[1]	100.0

Specific Categories of Response[2]

Disadvantage	N	%
No Facilities for Serious Complication	18	16.7
Inadequate Equipment/Instruments	11	10.2
Physician Inconvenience	10	9.3
All Other Responses	69	63.9
Total	108	100.0

[1] 27 additional respondents stated that there were no disadvantages.

[2] 112 physicians responded to this question including those noted in footnote 1.

Source: Physician Questionnaires

Exhibit IV-100

Advantages of the Hospital as a Setting for Minor Surgery

Advantage	N	%
Nature of Patient Care Process	59	37.8
Physical Characteristics of Facility	37	23.7
Facility Staffing	21	13.5
Convenience	17	10.9
Facility Efficiency	12	7.7
Administration	4	2.6
Cost	3	1.9
Insurance	3	1.9
Total	156[1]	100.0

Specific Categories of Response[2]

Advantage	N	%
Availability of Emergency Care	39	25.0
Availability of Equipment Instruments	14	9.0
Fall Facilities - Ancillary Services	9	5.8
Staffing (unspecified)	9	5.8
All other	85	54.5
Total	156	100.1

[1] 21 additional responses stated that there were no advantages

[2] 135 physicians responded to this question, including those noted in footnote 1

Source: Physician Questionnaires

Exhibit IV-101

Disadvantages of the Hospital as a Setting for Minor Surgery

Disadvantage	N	%
Excessive Cost	56	32.9
Facility Inefficiency	48	28.2
Administrative Inadequacy	28	16.5
Inconvenience	16	9.4
Inadequate Patient Care Process	10	5.9
Inadequate Staffing	8	4.7
Inadequate Physical Characteristics	3	1.8
Patient Dissatisfaction	1	0.6
Total	170[1]	100.0

Specific Categories of Response[2]

Disadvantage	N	%
Cost (unspecified)	50	29.4
Too Much Paper Work	16	9.4
Scheduling Problems	14	8.2
Time Factor	9	5.3
Not set up for minor procedures	9	5.3
Hospital rules & regulations too cumbersome	9	5.3
Slow turn around time between procedures	8	4.7
All other responses	55	32.4
Total	170	100.0

[1] 4 additional responses stated that there were no disadvantages

[2] 114 physicians responded to this question, including those cited in footnote 1.

Source: Physician Questionnaries

facility staff (25.0%); facility physical characteristics (23.5%); convenience (13.2%) facility efficiency (12.4%); cost (8.6%); and the patient care process (8.0%).

- The FSASC setting was rated as more satisfactory for minor surgery than any of the other alternative surgical settings for minor surgery with 74.4% of the physicians reporting as very satisfied. The OP setting received the lowest overall satisfaction ratings of the five alternative settings.
- The physicians office setting was perceived as very convenient for minor surgery by 87.2% of the physicians. The FSASC was next with 53.3%. Again, the OP setting was seen as the least convenient setting of the five alternative settings.
- Whereas cost and facility efficiency were reported by physicians as the most significant advantages of the FSASC settings, they were seen as the biggest disadvantages to the hospital setting for minor surgery.
- The most frequently reported specific disadvantages in the FSASC setting was the lack of backup facilities for serious complicatons, whereas this was the most frequently cited advantage in the hospital-based settings.

SUMMARY OF FINDINGS

This section summarizes the findings on quality of care evaluation presented earlier in the chapter. The overall finding is that the quality of care in the freestanding ambulatory surgical center is at least as good as in the alternative settings. That is, careful analysis of data on the structural, process, and outcome quality of care delivered across surgical settings shows that the quality of surgical services is at least as good in the freestanding ambulatory setting as it is in the other settings. The detailed findings dealing with structural, process, and outcome quality are summarized in the following sections.

Structural Quality

Compliance with State and Local Laws. With respect to compliance with state and local laws it was found that:

- No substantial differences were observed among surgical settings in the extent of compliance with Arizona state law and local codes

- The legal status of the FSASC as of April, 1976, was somewhat imprecise because of the absence of a specific licensure law to which the facility is subject and the lack of adopted regulations. The FSASC at that time had a "letter in lieu of licensure" from the Department of Health Services which permitted it to conduct business. Based on the legislation and regulations existing in other states, the characteristics of the FSASC and the other surgical settings in the study, and the authorizing letter from the state , it is likely that the FSASC would be granted a license if the legislation existed.[12]

Organization and Administration. With respect to the organizational and administrative aspects of structural quality one major finding emerged from the assessment:

- In the FSASC surgical setting to a considerably greater degree than in the hospital based alternative settings, the owners/directors were in direct, day-to-day control of the functions of the facility, particularly those functions related to direct patient care. This difference between the FSASC setting and the other surgical settings was primarily the result of two factors: The reduced size, scale, and complexity of the FSASC in comparison to the hospital institution; and the limited breadth and focus of the organizational mission of the FSASC.

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[12] The Orkand Corporation, The Influence of Federal and State Regulations, Policies of Third Party Payors, and Positions Adopted by National Organizations on Freestanding Ambulatory Surgical Centers, November 24, 1976. Submitted to the Social Security Administration under Contract No. SSA-PMB-74-387.

her principal findings are summarized below:

Governing Bodies - For hospital-based settings the institutional board of directors was larger in comparison to the FSASC setting and included individuals not directly involved in health care delivery. In contrast, the FSASC governing body, consisted of the two owners/directors of the facility who practice anesthesiology in the facility on a regular basis.

There were major differences in the extent of the delegation of authority between surgical settings. In the hospital-based settings there was substantially more delegation of authority within both administrative and nursing functions. In the FSASC, the owners/directors maintained more direct control of the operation of the facility.

Medical Staff - In the FSASC setting the medical staff was defined as the anesthesiologists who practice in the facility; whereas, the hospital-based settings considered all physicians with privileges as members of the medical staff. Therefore, at the FSASC, responsibility for patient care policies was focused on the anesthesiologists who provided the continuing monitoring of patients in the facility.

Relationship between the physicians (non-anesthesiologists) and the facility was less formalized in the FSASC setting than in the other hospital-based surgical settings. Control of physician privileges was thus maintained by the owners/directors.

Overly complex aspects of medical staff organization were to a great extent eliminated in the FSASC setting with the result that physician time was saved and paperwork reduced. It should be noted that physicians with privileges at the FSASC setting also were required to be on the staff of the one or more hospitals in the county and may therefore, already have had committee assignments or commitments on other hospitals' staffs.

Nursing Staff - In the FSASC setting, the nursing staff was directly responsible to the owners/directors. In all other surgical settings included in the study, the nursing staff in the operating and recovery room areas reported to the nursing administrator who, in turn, reported to an assistant or associate administrator. It would appear that the close liaison in the FSASC setting between nursing and owner/directors provided closer control of the nursing staff and an increased ability to respond to changes in staffing requirements.

In the FSASC setting, registered nurses were the only category of nursing personnel employed. In several of the hospital-based settings a combination of RNs and OR technicians were used to provide care in the operating suite and a combination of RNs and LPNs were used to provide care in the preoperative holding and recovery room areas.

In the FSASC setting, only an anesthesiologist administered anesthetics. In two of the inpatient facilities and on occasion in one of the HAASC settings, a Certified Registered Nurse Anesthetist administered the anesthetics. In all settings an anesthesiologist was either present in the operating room or on-call in the operating suite in case of difficulty.

Medical Records - The medical records used in the FSASC and HAASC settings are very abbreviated versions of the inpatient medical record. The OP setting medical record was typically found to be the least structured record of the four surgical settings. In contrast to the ambulatory records, the IP setting records were more complex and specific in information requirements.

The FSASC setting had no formalized medical records department although a chronological file and backup microfilm copies were maintained. The medical records of the HAASC settings were maintained by the inpatient hospital. In some institutions the OP setting records were not filed with the inpatient medical records department but were handled separately with less quality control and less information retrieval capability.

In the ambulatory settings, medical information for a single patient with multiple surgical episodes was not collated. In inpatient settings all information relative to one patient was included in the patient's single medical record. It should be noted that information on a single patient was generally not collated across institutions unless medical records were specifically requested by the physician or the institution.

The personnel at the FSASC setting responsible for the maintenance of the medical records apparently had less formal training in this area than the personnel in the other hospital based settings.

Laboratory, Radiology, and Pathology Services - The FSASC setting, in comparison to the hospital-based settings, maintained only a very limited in-house clinical laboratory capability. Hospital-based settings used the inpatient hospital's facilities for required tests. The major difference between the set of tests required by the FSASC and other settings was in the FSASC's lack of a requirement for a complete blood count or white blood cell count for surgery patients.

Across the ambulatory settings, chest x-rays were generally not required for minor surgery patients. All settings had at least a minimum in-house radiological capability; however the equipment maintained in the FSASC was relatively limited as compared to the equipment available in the inpatient setting.

Pathology services were available by outside arrangement for the FSASC setting. The examination of tissue removed from patients was at the discretion of the surgeon in contrast to the hospital-based setting where pathology review is routinely performed on all removed tissue.

The FSASC, in contrast with the hospital-based facilities, does not store blood, but can obtain it under a special arrangement from Good Samaritan Hospital across the street. (Only fifteen instances have occurred in eight years.)

Utilization Review. The following were the salient findings th respect to utilization review:

All facilities in the study had a formal organizational arrangement for utilization review. In the hospitals, review of ambulatory surgery was generally conducted as an adjunct to review of inpatient records. In the FSASC, however, a Medical Audit Team -- a voluntary body composed of members selected by the surgical subspecialty societies -- reviewed the practices and activities in the facility.

Physical Characteristics. The following were the important findings with respect to the physical characteristics of surgical facilities across the various settings:

- The hospital inpatient and traditional outpatient surgical facilities were physically in the same complex as the backup or supporting equipment and facilities. Among the HAASC and FSASC facilities, there was almost no difference in the physical proximity to these.

- No major differences were detected in the types of equipment applicable to minor surgery available across the surgical settings.

Facility Patient Care Policy. From the review of selected patient care policies as given by the facilities included in the study, it was found that:

- The facilities that had ambulatory surgical centers generally had more detailed and comprehensive policies for the care of minor surgical patients than IP or OP surgical settings.

- The policies of the HAASC and FSASC appeared to be at least as protective of the patients' safety and as careful about the patients' condition prior to discharge as the IP and OP settings.

Physicians' Perceptions of Patient Care Policies and Practices. Based on the responses by a sample of Maricopa County physicians to the physician questionnaire with respect to patient care policies, it was found that:

- For eleven of the twelve surgical procedures, the majority of physicians responding reported the FSASC as an appropriate setting for surgery. For tonsillectomy and adenoidectomy, only 44.4% of the physicians listed the FSASC setting as appropriate. It should be noted that the appropriateness designation was made based only on the surgical procedure type without regard to patient characteristics.

- The hospital outpatient setting was less frequently reported as appropriate for all twelve procedures than either the HAASC or FSASC settings.

- Vasectomy, excision of lipoma or sebaceous cyst and augmentation mammoplasty were reported as appropriate procedures for the physicians office setting by 91.7%, 78.0%, and 55.6% of the physician's respectively. None of the other twelve procedures were listed as appropriate in the physician office setting by more than 16% of the physician sample. This does not imply that, given certain patient or clinical characteristics, other settings are necessarily inappropriate.

- Dipstick urinalysis and hemoglobin or hematocrit were the clinical laboratory tests most frequently reported as necessary for minor surgical patients undergoing the twelve procedures included in the study. However, for myringotomy with adenoidectomy, tonsillectomy and adenoidectomy, inguinal herniorraphy, and advancement or recession of eye muscle, more than one-half of the physicians also felt a microscopic urinalysis should be performed. A white blood cell count was reported by a majority of physicians as necessary for tonsillectomy and adenoidectomy and the eye muscle procedures. A complete blood count was reported as necessary for myringotomy with adenoidectomy, tonsillectomy with adenoidectomy, and inguinal herniorrhaphy. A coagulation time test was also listed by an majority of physicians for the tonsillectomy and adenoidectomy procedure.

- The FSASC setting performed the two clinical laboratory tests most frequently reported as "should be performed" (dipstick urinalysis and hemoglobin/hematocrit). However, the FSASC setting, considering that a microscopic urinalysis, white blood cell count, and complete blood cell count were not routinely performed, did not necessarily meet all the clinical laboratory requirements for some selected procedures as identified by a majority of the physician sample.

- Chest x-rays were reported by a majority of responding physicians as preferred for only three procedures: breast mass excision (60.0%) inguinal herniorraphy (70.0%) and eye muscle operation (64.7%)

- Inguinal herniorraphy was the only procedure where more than one-half of the physicians reported that an EKG should be performed prior to surgery (57.9%)

- For six of the twelve procedures, a majority of the physician sample reported that an electronic cardiac monitor should be used.

- For all of the twelve procedures, a majority of the physician sample reported that pathology examination of tissues should be performed either in all cases or at the discretion of the surgeon.

Process Quality

Patient Flow. This section summarizes the major findings on patient flow patterns. Since much of the detail of this section was presented as a guide to the interpretation of the section that followed, and since much of the substance of the patient flow is quite evident from the basic nature of each setting, only the major differences between settings are presented as findings. These are as follows:

- The FSASC setting appears to place the fewest demands on the patient for amount of time and number of interactions with the facility prior to admission for surgery and during the pre-operative phase. Whereas one HAASC requires a visit to the main hospital for laboratory work prior to the day of surgery and the OP and IP setting also require the patient's interaction with the hospital laboratory departments and, in some cases, the radiology departments, the FSASC provides minimal laboratory services within the facility adjacent to the preoperative holding area.

- The HAASCs differed in their approach to scheduling laboratory work for minor surgery patients. One HAASC required the patient to report to the main hospital laboratory within 48 hours of the scheduled day of the surgery. The other HAASC performed the lab work in an outpatient laboratory after the patient was admitted.

- Nearly all FSASC and HAASC patients (94.1% and 94.6%) and most OP patients (82.4%) recall having received preoperative instructions, but only 49.1% of IP patients could recall this. However, this was not unexpected, since the facility can exercise a greater degree of control over a patient in the IP setting.

- Patients interviewed after a surgery reported different numbers of provider visits during the screening phase. FSASC patients had the fewest provider visits with about two thirds having only one visit. Approximately 37% of the IP setting patients had only one visit.

- In the FSASC, patients are generally not premedicated in the preoperative phase, while this is done for some procedures (e.g., plastic surgery) at one HAASC and for nearly all procedures at the other HAASC and in the IP and OP facilities.

- In the post-operative phase, more emphasis was apparently placed on immediate wakefulness and the exercise of motor skills in the ambulatory settings than in the IP setting.

- All the facilities except for one HAASC place the responsibility for discharge on the supervising anesthesiologist. The one HAASC may place this responsibility upon the surgeon.

- All of the ambulatory settings required patients to be discharged in the company of an adult. In some individual cases and for some procedures, patients that had surgery on an ambulatory basis were transferred as a "post-op admit" to an inpatient facility (in the case of an HAASC) or to a convalescent care facility for observation.

- Across all settings, 85% or more of the patients were discharged to their homes. Reflecting post-up admits, 4.7% of the HAASC patients were admitted to the inpatient institutions, but only one OP and two HAASC patients were admitted to inpatient institutions.

- The FSASC and HAASC settings made follow-up telephone calls the day after surgery to inquire about the patient's condition, while there was no regular practice to do this in the IP and OP setting.

- Forty percent of the FSASC setting patients and 43% of the HAASC patients had one follow-up visit to a provider during the recuperative phase as compared with 33.3% of the IP and 32.4% of OP setting patients. Whereas the IP patients generally had two or more follow-up visits, 26.5% of the OP setting patients reported no follow-up visit to a provider after surgery.

Patient Characteristics by Surgical Setting. From the analysis of demographic and medical characteristics of patients by type of surgical setting, the principal finding is as follows:

- Overall, the screening processes, both formal and informal, that match patients with appropriate surgical settings appeared to be working, in that lower risk patients, as measured by the set of variables included in this analysis, were being treated in the HAASC and FSASC settings. The IP setting, quite properly, appeared to be treating the higher risk patients for the procedures studied. Surprisingly, the OP setting appeared to be accepting patients of higher risk than either the HAASC or FSASC settings.

This summary level finding is supported by the detailed findings on patient demographic and medical characteristics given below:

Demographic Characteristics:

- Age - For most procedures, there was little difference across settings in mean patient age. However, for the dilation and curettage and excision of breast mass procedures, IP patients were found to be significantly older -- and thus presumably at higher risk -- than patients in ambulatory settings.

- Race - 91.6% of all of the patients were white, 6.4% Hispanic, and 2.3% Black. Minority patients appeared to be under-represented in the sample generally but were over-represented in the OP setting due to the influence of one large institution.

Medical Characteristics:

- ASA Index - A large proportion (84.1%) of all of the patients undergoing these minor procedures were apparently relatively good risks for anesthesia, i.e., in category 1. However, the IP and OP settings accepted a proportionally greater number of patients in higher risk categories than did the HAASC and FSASC settings.

- Hemoglobin/Hematocrit Levels - Overall, 18.5% of all patients' combined hemoglobin/hematocrit levels were found to be below normal. However, 36.3% of the IP patients, 25.4% of OP, and 15.2% of both HAASC and FSASC patients were in this category. Thus, a significantly higher proportion of IP patients were found to have below normal readings as compared to FSASC and HAASC patients.

- Pre-existing conditions - For many specific pre-existing medical conditions which can cause a patient to present a higher risk profile, the IP setting included a significantly greater proportion of patients than the other settings. For heart disease, for instance, 6.8% of the IP patients reported this but 2.3% of the ambulatory patients. Other conditions appearing significantly more often in IP patients were lung disease, kidney disease, endocrine disorders, and major skeletal disorders.

- Obesity - A significantly greater proportion of patients having surgery in the OP setting were obese as compared with the patients in the IP, HAASC, and FSASC settings. The HAASC and FSASC settings had a greater proportion of patients with weights within the normal range for the patients' age and height than did the OP and IP settings.

- Medications in current use - Of patients using specific medications prior to their surgery, a significantly higher proportion had procedures performed in the IP setting as compared to the ambulatory settings. For example, 8.7% of the IP patients used tranquilizers, but only 3.7% of the ambulatory patients. Other medications for which a significant difference was detected were steroids, diuretics, antihistamines, cardiogenics, and antibiotics.

- Urinalysis findings - Of the substances found in patients' urine that could indicate a pathology, between .8% and 4.0% of patients displayed these findings. However, a substantially greater proportion of IP patients had positive findings as compared to ambulatory patients. The differences for protein and blood found in the urine were significant with $p \leq .10$ and the differences for glucose and ketones for $p \leq .20$.

Treatment Characteristics. Based on the analysis of differences in treatment characteristics for the twelve surgical procedures, the following principal finding is warranted.

- No major differences between surgical settings in the treatment of comparable minor surgical procedures were identified. Although minor differences did occur, it was not apparent that these differences significantly affected the quality of the surgical process.

The following findings highlight the minor differences in treatment characteristics that were observed for the patients included in the study.

- For some procedures, particularly myringotomy and adenoidectomy and dilation and curettage, it would appear that patients with less serious indications were being treated in the ambulatory settings as compared with the IP setting.

- A general anesthetic was used for 86.1% of the patients included in the study. For excision of breast mass, ganglionectomy, vasectomy, circumcision, augmentation mammoplasty, and excision of lipoma or sebaceous cyst, some patients in the sample were given a local anesthetic. For vasectomy, augmentation mammoplasty, and excision of lipoma or sebaceous cyst a local anesthetic was given in 66.7%, 84.0%, and 64.3% of the cases respectively in the FSASC setting. The FSASC used local anesthetic a greater proportion of the time for these three procedures than did the HAASC setting. In the IP setting a general anesthetic was used in all but one case.

- The hospital-based settings were found to generally premedicate patients whereas in the FSASC setting premedication was generally not used.

- The only difference noted in the use of specific anesthetic agents among settings was the use of D. tubo curare in 44.5% of the cases in the FSASC setting. Twenty percent of the patients in the OP setting, and only 6.0% in the HAASC and 5.0% in the IP were given this anesthetic.

- No significant differences in the types or distribution of operative findings were noted among surgical settings for the procedures included in the study.

- For myringotomy with adenoidectomy, tonsillectomy and adenoidectomy and circumcision, pathology tissue examination was performed on only 13.3%, 13.3%, and 33.3% of the patients in the FSASC setting respectively compared with all patients undergoing these procedures in the hospital-based settings.

- From the analysis of patient time by phase of care in the facility, it appeared that the FSASC could move patients through the preoperative and operative phases with less delay.

- The FSASC setting generally held patients in the recovery room area at least as long as the other ambulatory settings. The FSASC was apparently not discharging patients prematurely from the facility.

- Personnel in the FSASC setting on the average spent less direct time with patients in the operating room and recovery room than personnel in the other surgical settings. For the operative phase this is in part accounted for by the shorter time in the operating room observed for FSASC patients for some procedures. The high volume of patients in the FSASC setting and IP setting recovery rooms may, in part, explain the lesser direct personnel time per patient observed in the post-operative phase for these two settings.

Outcome Quality

Surgical Deaths. From the absence of surgical deaths in the ambulatory surgical centers included in the study, it may be concluded:

- The ambulatory surgical center setting, from the standpoint of surgical death incidence and rate, has had an excellent record of quality patient care and safety. In this regard, the FSASC setting appeared to be at least as safe as the hospital-based ambulatory surgical center settings. It should be noted that although no surgical deaths occurred--a principal finding of the outcome quality study--this measure may not be sensitive enough to differentiate or discriminate between surgical settings with respect to other aspects of outcome quality.

Unscheduled Transfers. From the low incidence of unscheduled transfers and the nature of the procedures for which the transfers were required, the following may be concluded:

- It appears that no life-threating emergencies developed in the FSASC or HAASC for the patients included in the sample that required transfer to another surgical setting. Therefore, with regard to this aspect of the quality of patient care and patient safety, the ambulatory surgical centers appear to have an excellent record.

- Although three unscheduled patient transfers were observed for the patients included in the sample, all three resulted from the detection of a malignancy and the need for additional surgery. None of the transfers appeared to be related to the type or level of patient care rendered in the FSASC setting.

- All three transfers observed occurred after the patient had spent time in the FSASC recovery room and the transfers were accomplished without incident. The proximity of a fully equipped major inpatient hospital across the street from the FSASC appeared to be an important factor in this transfer in that all three patients were subsequently admitted to this facility for further surgery.

Complications. Based on the preceding analysis of complications reported for patients included in the sample, it was found:

- No incidence for six specific types of complications could be detected across the four surgical settings for patients included in the sample. Those complications included hemorrhage, shock, cardiac arrest, aspiration, anaphylsis, and the need for transfusion.
- For nine complications that occurred with relatively low frequency in the surgical settings, the FSASC experienced a relatively higher proportion of patients with hypotension in the post-operative phase (5.3%) than did the other surgical settings.
- The FSASC setting experienced a relatively higher proportion of patients with nausea (24.7%), vomiting (20.4%) and pain (43.4%) in the post operative phase than did the IP setting or the OP and HAASC settings. However, the differences noted may be the result of the variation in medical information recording practices across surgical facilities.

Patient Disability. The following was the major finding with regard to patient disability:

- No systematic differences between surgical settings in either the number of bed days or disability days after surgery could be detected because of the relatively large variance in the number of days compared with the mean. Therefore, there is no evidence to indicate that the patients treated in ambulatory surgical settings require more (or less) recuperative time than patients in the IP setting.

Patient Satisfaction. Based on the analysis of patient satisfaction with the surgical episode, it was found:

- Very little difference was detected in the overall level of patient satisfaction with the IP, HAASC, and FSASC surgical setting with 85.5%, 84.7% and 86.8% of the patients in the setting respectively indicating they were overall very satisfied with the care received. Of the proportion of positive comments made about a surgical setting, the FSASC elicited the largest percentage of such comments with 82.0% compared with 78.6% for the HAASC, 71.2% for IP and 54.0% for OP.

- A smaller proportion of patients reported being very satisfied with the OP setting (78.1%) as compared to the alternative settings. Similarly a greater percentage of negative comments were elicited from the OP setting patients (45.8%) than for any other setting.

- A larger proportion of patients in the ambulatory setting than in the IP setting would have considered delaying the procedure if the scheduled time for surgery had become inconvenient. It may be concluded that for the patients in the ambulatory settings the timing of the surgery was not considered as critical as for patients in the IP setting.

- Based on an index of thirteen satisfaction factors, the HAASC and FSASC settings were considered more satisfactory than were the traditional IP and OP settings. 37.3% of the IP and 43.9% of the OP setting patients scored these settings below 50 on the 13 to 65 scale as compared to only 16.3% and 15.7% of the patients in the HAASC and FSASC settings.

- Four factors were consistantly rated higher for a larger proportion of patients in the HAASC and FSASC settings than in the OP and IP settings. These factors were: Friendliness of facility staff; attention to patient needs; pleasantness of physical environment; and general quality of care.

- In selecting a surgical setting, five factors appeared to be the most important to the patients in the sample:

Facility cleanliness, service quality, physician's qualifications, facility staff, and physician's attitudes. There was little variation among settings in the relative importantance of these factors.

- Conversely, five factors also seemed to be relatively unimportant in the selection of a surgical setting as perceived by the patient: transportation and parking, income loss, facility location, cost of the surgery, and the amount of time required. Again little variation was observed in the relative unimportance of those factors.

- A larger proportion of patients who had surgery in the HAASC (96.0%) and the FSASC (94.8%) would choose the same surgical setting again than compared to the IP (84.2%) and OP settings (82.4%).

- The importance of home care assistance after surgery was perceived as more important to patients in the IP setting (80.4% responded it was very important) than to patients in the ambulatory settings (63.3% for OP, 66.5% for HAASC, and 63.3% for FSASC patients). However, home care help was generally more available for patients who had surgery in ambulatory settings than for patients in IP settings.

Physician Satisfaction. With respect to physicians' reported satisfaction with alternative surgical settings it was found:

- The most important factors as reported in the physician questionnaire that appear to determine the level of physician satisfaction with a surgical setting are: facility staff (25.0%); facility physical characteristics (23.5%); convenience (13.2%) facility efficiency (12.4%); cost (8.6%); and the patient care process (8.0%).

- The FSASC setting was rated as more satisfactory for minor surgery than any of the other alternative surgical settings for minor surgery with 74.4% of the physicians reporting as very satisfied. The OP setting received the lowest overall satisfaction ratings of the five alternative settings.

- The physicians office setting was perceived as very convenient for minor surgery by 87.2% of the physicians. The FSASC was next with 53.3%. Again, the OP setting was seen as the least convenient setting of the five alternative settings.

- Whereas cost and facility efficiency were reported by physicians as the most significant advantages of the FSASC settings, they were seen as the biggest disadvantages to the hospital setting for minor surgery.

- The most frequently reported specific disadvantages in the FSASC setting was the lack of backup facilities for serious complicatons, whereas this was the most frequently cited advantage in the hospital-based settings.

V. EVALUATION OF THE SYSTEM IMPACT OF A FREESTANDING AMBULATORY SURGICAL CENTER

PURPOSE AND OBJECTIVES

This chapter presents an examination of the impact of a freestanding ambulatory surgery facility on the delivery of surgical services in Maricopa County, Arizona. The purpose of the chapter is to answer a series of questions concerning the facility's overall impact, such as whether the Surgicenter drew its cases from traditional settings at nearby institutions, whether it induces increases in the quantity of surgical services demanded or changes in the type of surgeries performed, and how other institutions in the Maricopa County area responded to the introduction and competitive pressure of the freestanding ambulatory surgical center.

This chapter is organized in seven sections:

- Introduction, which details the purpose and objectives of the impact analysis.
- A discussion of the analytical issues and limitations involved in assessing the impact of the freestanding ambulatory surgical center
- A summary of the methodology used in the impact study (a more complete discussion of the impact methodology appears in the Appendix)
- The aggregate findings and conclusions of the analysis including those relating to:
    - Surgical demand

  - Surgical rate
  - Surgical facility utilization
  - Surgical resources
  - Surgical revenues, costs, and prices
- The procedure-specific findings and conclusions, including:
  - Trends in volume and rates for specific procedures
  - Changes in the distribution of specific procedures across settings
  - Patient characteristics by procedure
  - Estimates of operation time by procedure
- The impact of the Medicare program of facility fee reimbursement on the utilization of the FSASC by Medicare eligibles
- A summary of salient findings and conclusions

Project Objectives

The following are the seven principal objectives of the impact analysis:

- Determine changes in utilization of surgical services in Phoenix, Arizona
- Determine changes in distribution of surgical procedures across alternative surgical settings
- Examine changes in the frequency and setting for procedures that are Outpatient Eligible (OPE)
- Examine changes in the availability of surgical resources
- Examine changes in surgical facility prices and revenues

- Analyze the response of the Phoenix health system to FSASC innovation and competition
- Determine effects of Medicare reimbursement of FSASC on the surgical demand for outpatient surgery for the Medicare population.

ANALYTICAL ISSUES AND LIMITATIONS

Introduction

In considering the impact of a freestanding ambulatory surgery facility[1] on the conduct of surgery in Phoenix, a number of important analytical and methodological issues must be considered. These are presented in two sets. The first set of issues is primarily theoretical and pertains to an analysis of how surgery services are delivered. These issues are:

- Roles of surgeons and patients in determining sites for surgery
- Degree of substitutability among alternative surgery settings
- Institutional methods of setting surgery prices
- Setting incentives contained in private and public third-party payment mechanisms

The second set of issues is related to the study methodology. This set focuses the analysis on the critical elements required to gauge the impact of the freestanding ambulatory surgery center (FSASC). They are:

- The relatively small share of total Phoenix surgeries performed at the FSASC
- Problems in estimating non-institutional utilization of surgery services
- Limited samples of institutions and time periods

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[1] In all discussions of the freestanding ambulatory surgical setting in this report, it should be understood that a single Facility--the Phoenix Surgicenter--is the only Facility representing this surgical setting. For each of the other settings, the analysis is based on data from two or more facilities.

Analytical Issues

Roles of Surgeons and Patients. In many instances, surgeons, rather than patients make the selection of a surgery setting. The relative importance assigned to either the preferences of surgeons or patients depends on a number of factors. The relationship between the surgeon and patient is critical. The degree of confidence a patient has in the surgeon may be the most important element in determining the amount of decision-making power that is delegated to the surgeon. The more complex the operation, then, the more likely it is that the surgeon will be the principal in determining the institution in which the surgery is to take place. Patient preferences for site of surgery are probably formed in the same was as are preferences for other goods and services.

Perceived quality of care, the nature of the surgery environment, and the reputation of particular institutions may all play roles in determining patient preferences. Surgeons are likely to influence these preferences to a greater or lesser degree, depending on how much decision-making authority has been delegated to them.

Patient incomes, relative prices of surgery settings, level of insurance coverage, amounts of deductibles, ease of access, and opportunity costs of time will serve to constrain preferences. A significant proportion of patients pay for ambulatory services out-of-pocket; there may, in addition, be charges uncovered by insurance. Wide-spread coverage by public and private third-parties probably serves to dampen cost-consciousness in setting selection of patients. In the aggregate, however, it is likely that cost consciousness may have some influence.

Surgeon preferences for site of surgery depend on similar factors, among them perceived quality of care, ease of access, reputation of institutions, and institutional efficiency in handling patients. The extent to which cost-consciousness influences surgeons' setting selection depends on surgeons' perceptions of the financial status of their patients. Setting selection is a joint decision between patients and surgeons, but the final responsibility rests with the latter. The success of an innovation in the delivery of surgery services will therefore depend principally, especially in the initial stages, on the extent to which it is accepted by surgeons.

Degree of Substitutability Among Alternative Surgery Settings

In reasonably competitive environments where products are significantly differentiated, substitution of one product for anther is influenced strongly by relative quality of the products and their relative prices. If the conduct of surgery were also reasonably competitive, the substitution of new settings (FSASC and HAASC) for traditional settings would also be influenced strongly by relative qualities and prices. Surgeons and patients, acting jointly, would opt for one setting over another on grounds of quality, price, and other real cost factors such as ease of access, efficiency of institutions, and opportunity costs of time. Holding quality of care constant, changes in average prices of surgery procedures in ambulatory settings with respect to prices of similar procedures in traditional settings may result in shifts of procedures among settings. If there are relatively lower prices in ambulatory settings, and greater convenience to both surgeons and patients, a result may be shifts in surgery utilization from traditional to ambulatory settings. There is some evidence that in medical markets, shifts from inpatient to outpatient settings may result from changes in their relative prices.[2] The principle of elasticity of substitution may be applied here, in altered form changes in relative real unit costs of surgery to consumers and surgeons acting jointly may lead to shifts in utilization among settings. An increase in the relative real cost of surgery done on an inpatient basis will tend to increase the quantity demanded of ambulatory surgery.

Substitution among settings is applicable to only a subset of surgery procedures. Due to high required capital or skill intensity, conditions of patients, and multiplicity of procedures in individual cases, some procedures and some cases are simply not eligible for delivery on an ambulatory basis. Such procedures and cases are termed inpatient only. Other procedures and cases are eligible for ambulatory delivery whether in OP, HAASC, or FSASC settings. These procedures and cases will be termed outpatient-eligible. Clearly, the elasticity of substitution among settings of inpatient-only cases approaches zero. Price changes of such cases will have little discernible impact on utilization of ambulatory settings.

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[2] Karen Davis and Louise B. Russell, "The Substitution of Hospital Outpatient for Inpatient Care," Review of Economics and Statistics (May 1972) V. 21, No. 2, pp. 109-120.

Institutional Methods of Setting Surgery Prices

Surgery-related prices in hospitals consist mostly of operating and recovery room rates, anesthesia charges, charges for drugs and ancillary services, and rates for associated hospital stays. Ambulatory surgery facilities obviously do not charge for the latter. Operating and recovery room rates are typically based on hourly use of these facilities, largely without consideration of specific surgery procedures performed.

In contrast, ambulatory surgical centers in Phoenix charge a flat rate per procedure. It is possible that hospitals in the Phoenix area responded to the operation of the Surgicenter by defining their rates—especially for outpatient eligible procedures—in terms of a flat fee per procedure.

One other aspect of this issue is that of cross-subsidization, where one service within an institution subsidizes another. A possible effect of the establishment of Surgicenter is a reduction in this phenomena, as ASC charges more reflective of actual costs serve as competition for hospitals seeking to cover losses in other departments through inflated surgical fees. This is discussed in the analysis presented below.

Setting Incentives Contained in Third-Party Payment Mechanisms. Public and private third parties pay for over 90% of all surgeries in Phoenix, whether inpatient or ambulatory. Medicare alone pays for about a fifth of surgeries done at major downtown hospitals. The conditions that Medicare, and, in particular, Blue Cross, place on their payment may place obstacles to, or provide inducements for, substitution of surgeries among settings. Until 1974, Medicare did not pay a facility fee for surgeries performed at Surgicenter. Third parties, including commercial insurance carriers, have traditionally tended to favor provision of health, including surgery services, in traditional inpatient settings. One focus of the analysis presented below is a determination of the effect that the demonstration program begun in April, 1974 for reimbursement of facility fees for Medicare patients having surgery at the Surgicenter had on the Medicare patient volume at the facility.

Methodological Issues

Relatively Small Share of Surgeries Performed at Surgicenter. In 1975 Surgicenter's volume of cases took about a 7% share of the total number of surgery cases handled by all health care institutions in the Phoenix metropolitan area (see Exhibit V-1, below). Surgicenter is located in the middle of downtown Phoenix, an area full of major hospitals. The relative smallness of Surgicenter's share of surgeries and its proximity to large institutions that also deliver surgery services suggests that its impact is likely to have been largely confined to hospitals in downtown Phoenix.

Surgicenter competes with these institutions for surgery cases that are both outpatient-eligible and of relatively low medical risk. Surgicenter's institutional competitors are complex facilities providing broad arrays of services. Even if in some instances, their provision of outpatient-eligible surgery cases has declined somewhat, impacts on the institutions as a whole may not be readily perceptible. One issue that needs to be explored is whether losses in inpatient stays associated with outpatient-eligible surgeries have been offset by gains in inpatient stays in other areas; losses in net revenues from outpatient-eligible surgeries may have been offset by rate changes; effects on such hospital characteristics as length-of-stay, percent female, or even distribution of surgery cases among specialty may not have been noticable. Even if changes in any of these indicators have occurred, it is possible that they may not be attributable to the Surgicenter's operations.

Problems in Estimating Non-Institutional Utilization of Surgery Services. In the previous discussion of substitution among alternative surgery settings, explicit consideration of the possibility of substitution out of surgeon's offices into Surgicenter and other ambulatory facilities was omitted. Unfortunately, it proved virtually impossible to estimate the volume of surgery performed at surgeon's offices over time due to the refusal of physicians to open their records to outsiders. Conversations were held with 15 physicians in Maricopa County, and the result was a determination that (1) few physician's records allowed a historical breakdown of surgeries by type of surgeries; (2) very few physicians would allow access to their patient records; therefore, a decision was made not to include the physician's office setting in the study.

Hence the scope of the analysis was narrowed to include solely institutional settings for surgery. It may be possible to make rough inferences about volumes of cases drawn from surgeons' offices on the basis of increases in volume at Surgicenter not accounted for by shifts out of institutional settings, but such inferences would have to be quite tentative, in light of rapid population changes in Phoenix.

In addition, both emergency and non-emergency surgeries performed in emergency rooms were not included in the analysis. The reason for this is that the record-keeping on such procedures is typically very incomplete and inadequate; logs of these procedures are likely to have substantial gaps and inaccurate descriptions of the procedures performed. Therefore, the analysis contained in this study focuses exclusively on procedures performed in surgical operatories. (This limitation is not considered to have affected the analysis adversely.)

A Limited Sample of Institutions and Time Periods. A priori, the greatest impact arising from the establishment of the Surgicenter would be expected to be felt on those institutions nearest to it spatially. This is due to the overlapping practice patterns of most surgeons among the major downtown hospitals and the Surgicenter. Therefore, given the limited project resources, a group of seven "Primary Impact Institutions" was selected for analysis based on proximity to the Surgicenter and institutional cooperation in the study effort. In 1975, taken together with Surgicenter, those institutions accounted for about half of the surgeries performed in the Phoenix area. Because of the substantial yearly volume of surgery cases handled at these impact institutions, and the constraints of project resources, it was also decided to limit the number of years to be investigated for the procedure-specific analysis. The years 1969, 1972 and 1975 were selected to provide a year prior to the introduction of the FSASC, a year after the opening of the FSASC and one HAASC, and a year in which the FSASC and both HAASCs at the impact institutions were providing surgical services. As discussed in the analysis, the selection of institutions was not intended to be representative of Maricopa County but rather to provide a set of facilities where the impact of ambulatory surgical facilities was most heavily felt.

SUMMARY OF THE IMPACT METHODOLOGY

Introduction

In this section, a summary of the methodology used in conducting the impact study is presented. A detailed description of the methodology is provided in the Appendix. This summary includes the following major sections:

- Summary Volume Data for 20 Facilities
- Selection of Primary Impact Institutions
- Selection of Study Years and Sampling Methodology
- Surgical Procedure Data Collection
- Hospital Revenues, Costs, and Prices
- Surgical Resources Inventory
- Demographic and Socioeconomic Information

These are presented in the sections that follow.

Summary Volume Data for 20 Facilities

Summary data on surgical volume were collected from 20 hospitals in Maricopa County for the 1967 to 1975 time period. The central variables consisted of surgery volumes from 1967 to 1975 by setting. Considerable difficulties were encountered in obtaining these data. Secondary sources accessible to the public do not exist and a number of institutions declined to participate in the study, both on grounds of perceived confidentiality, and because they apparently lacked the relevant information. The information that was obtained often omitted several time periods. Complete information, however, was obtained from the hospitals most likely to have been affected by Surgicenter (i.e., the primary impact institutions.

Hospitals that agreed to participate provided substantial amounts of information, some of it conflicting. The principal data sources included:

- Operating room records and log books
- Department Statistics from Business and medical records offices
- Hospital Activity Summary (HAS) prepared for the American Hospital Association.

Although the conflicts in a few instances were irreconcilable, most were resolved by obtaining counts of outpatient surgery done in operating rooms segregated from those done elsewhere in hospitals and including only numbers of cases, not operations or procedures.

Selection of Primary Impact Institutions

For detailed assessment of impacts, a decision was made to concentrate most heavily on the primary impact institutions. These institutions were viewed as the ones most likely to be affected by Surgicenter. The impact hospitals include:

- Good Samaritan
- St. Joseph's
- St Luke's
- Phoenix Baptist
- Scottsdale Memorial
- Memorial

There were selected for the following reasons:

- Proximity to Surgicenter
- Judgment of knowledgeable observers
- Assessment of current data on surgery volume
- Agreement to cooperate

The two largest hospitals in Phoenix are located in Surgicenter's immediate neighborhood. The other designated impact institutions are within five miles of Surgicenter. In the view of knowledgeable physicians, hospital administrators, and health planners, Surgicenter attracted physicians and patients mostly from Good Samaritan and St. Joseph's, possibly from St. Lukes and Memorial, and helped induce Scottsdale Memorial and Phoenix Baptist to start HAASCs. Three hospitals within a radius of five miles from Surgicenter, Phoenix General, John C. Lincoln, and Doctors declined to participate as primary impact institutions. (They are, however, included in the aggregates of surgeries performed at the 20 institutions). Maricopa County General Hospital, a "welfare" institution was omitted because it appeared to operate with a different mix of clientele than Surgicenter.

Selection of Study Years and Sampling Methodology

To analyze shifts in specific procedures among impact institutions and to identify the characteristics of these procedures, intensive investigation of operating room records was required. Because the volume of surgeries at impact institutions was so high, a twenty-day sample for each of three years, 1969, 1972, and 1975 was selected.

To ensure comparability among institutions, weekends were omitted from the samples. A random twenty-day sample was expected to produce a relative error for annual estimates of about 1.7%. The samples were stratified by day of week, in order to assess daily variation in surgery volumes. Four dates were selected for each day of the week, for a total of twenty days per year. For each year, a sample size of approximately 6-8% of the annual volume was expected, or about 2600 to 3400 cases. Estimates of annual volumes of procedures and cases were obtained by multiplying sample observations by 12.5.

Although the same dates were used for most institutions, in two instances, missing data required the use of other dates. At St. Joseph's 1968 instead of 1969 days were used. At Good Samaritan, eight alternative dates were used in 1972.

Surgical Procedure Data Collection

Surgical Case Coding. Surgery coding was performed by The Orkand Corporation project staff at Good Samaritan and St. Joseph's Hospitals, and at Surgicenter. Designated hospital staff trained and supervised by the project team coded the information at the remaining hospitals. Surgery case coding forms were developed that included the following data elements:

- Facility
- Setting
- Date of Surgery
- Medical Record Number
- Sex of Patient
- Age of Patient
- Specialty
- Type of Case
- Procedures
- Anesthesia Type
- Operating room number
- Anesthesia Time
- Payment Source
- Day of Week
- Physician Number
- Physician Name

A sample form and coding instructions are provided in the Appendix.

The basic data sources for the case coding forms consisted of operating room logbooks and operating room records. Logbooks, available at St. Luke's, Phoenix Baptist, and Scottsdale Memorial, were limited to one line per case, are less informative than records. The latter available at Good Samaritan, St. Joseph's, and Memorial, were one full page per case and were designed as supplements to medical records. Given logbooks, other data sources were reviewed to obtain the data on age, sex, and pay source needed to complete the coding forms. Setting, though typically readily identifiable by medical records numbers or other notation at times was difficult to determine at traditional operating rooms and additional data sources were called upon. At two institutions, anesthesia time was not available before 1970; age, sex, and payment source were also available for less than the full sample.

Cases were reclassified by complexity on the basis of number of procedures per case and number of IPO procedures. After the procedure tallies, the most critical data elements were type of case, which provides a measure of the potential proportion of ambulatory surgery, and physician number, which provides an indicator of how physicians shifted their practices among settings over the time period.

Inpatient Surgery Characteristics. The main inpatient variables on which data were collected included:

- Number of surgery inpatients
- Number of surgery inpatient days
- Length of stay
- Percent of female patients
- Percent of patients over 65
- Percent Medicare patients

With the exception of the last variable, all data elements were disaggregated by surgery specialties.

The principal data source consists of "Analysis of Hospital Service Reports" completed by hospitals at least once per year. At four hospitals, these are PAS reports. At two others, they are generated independently. Although specialty categories differ over time and among hospitals somewhat, these reports provided valuable insights into changing inpatient surgery patterns over time.

Hospital Revenues, Costs, and Prices

General and Operating Room Revenues and Expenses. Data were collected on the following variables:

- Total revenues
- Total expenses

- Total operating room revenues
- Total operating room expenses without depreciation

Partly because of the reluctance of hospitals to make available budgetary information, the principal data source consisted of Medicare Cost Reports. These Reports were readily available at Arizona Blue Cross. Depreciation was omitted from operating room expenses partly to obtain a rough measure of the ability of operating rooms to produce revenues for hospitals and partly because depreciation is sometimes allocated capriciously. The variables were combined into rough measures of "profitability", in order to test for any effects of Surgicenter's operations.

Surgery-Related Prices. The variables on which data were collected included:

- Operating room rates, by class of operation (major or minor)
- Flat fees for outpatient surgery procedures
- Semi-private room rates.

Before 1972, these data were available only from hospitals. Price data were not easily obtainable; in some cases, the data reportedly did not exist. After 1972, price data were available from the State Bureau of Health Economics.

Operating room rates generally are charged by the hour and by class of surgery, usually major or minor, though by 1975 some hospitals began differentiating surgery among more classes. Flat fees refer to prices per procedure, similar to prices for other goods. Semi-private room rates were included in order to obtain estimates of how non-surgery hospitals prices changed over time.

Surgical Resources Inventory

As the population of greater Phoenix grew, so did surgery resources. Information on surgery resources consitutes a necessary element in assessing the impact of Surgicenter. The main variables on which data were collected included:

- Capacity in beds of all hospitals in greater Phoenix

- Number of operating rooms in all hospitals and ambulatory surgery facilities in greater Phoenix
- Number of physicians and surgeons by specialty in greater Phoenix

Data on bed and operating capacity were obtained from hospitals, state government agencies, and other sources such as the American Hospital Association's annual Guide Issue. Information obtained directly from hospitals appeared to be most reliable; information from state government agencies, though comprehensive, was occasionally in error. For hospitals, outside of the impact area defined below secondary data sources were generally used. Information on physicians and surgeons by specialty was collected from Phoenix telephone directories and the Arizona Medical Association.

Demographic and Socioeconomic Information

Information on population, population characteristics, income and prices constitute critical elements in the utilization of and demand, for surgery resources. The Phoenix area grew rapidly during the late 1960's and early 1970's, and surgery utilization grew also. Data were collected on the following variables:

- Population of Maricopa County, greater Phoenix, and Phoenix city
- Population characteristics
  - Sex
  - Age
  - Ethnic Group
- Median, per capita income, and income distribution
- Unemployment and poverty
- Automobile ownership
- Health insurance coverage
- Number of retirees.

Data were collected principally from the Bureau of the Census, agencies of the State government, and from private organizations. It was decided that for the purposes of the impact study, use of data on the County as a whole was appropriate, because it was doubtful that Surgicenter's impact was limited to within Phoenix city limits.

FINDINGS: AGGREGATE ANALYSIS

In this section, the findings are presented related to the aggregate impact of the introduction of Surgicenter Incorporated, a freestanding ambulatory surgical center, on the delivery of surgical services in Maricopa County, Arizona.

The analysis examines, in detail, the characteristics of the demand for surgical services in the Maricopa County area over the nine year period 1967 through 1975 and the changes in the nature of the demand for surgery and in the types of surgical resources available in the area that occurred coincident with, and as a result of, the opening of the freestanding ambulatory surgical center.

The focus of the analysis is the demand for surgical services as manifested by the frequency of surgeries performed in institutional settings. As described in the methodology, surgeries performed in physicians' offices were not included in the analysis because of limited physician cooperation and the lack of historical data on surgical volumes for the time period. Institutional surgery was further narrowed to include only those surgeries performed in the operating rooms of the facilities included in the evaluation. Surgeries performed in hospitals outside of operating rooms in such locations as emergency treatment rooms, X-ray rooms, and clinics were excluded from consideration because of the absence of consistent reporting, across institutions of these non-operating room cases. For the purposes of the study, a surgery or surgery case was defined as a single operating room episode for the treatment of a patient. It is possible that during a patient's stay in a facility more than one operating room episode may take place. However, this is relatively infrequent and, in general, the number of operating room episodes is approximately equal to the number of surgery patients.

A single surgery case or operating room episode may, however, involve multiple surgical procedures. For example, a diagnostic dilation and curretage may be performed during the same operating room episode as a laparoscopy with bilateral tubal coagulation. Thus, in this example the surgery case is composed of two surgical procedures. The analysis of the frequency of specific individual surgical procedures is presented in a subsequent section of this chapter.

The institution settings included in the evaluation are defined and described in the methodology. In the analysis, the following abbreviations are used to refer to the surgical settings or combinations of settings:

- IP - Traditional hospital inpatient
- OP - Traditional hospital outpatient
- HAASC - Hospital affilated ambulatory surgical center
- FSASC - Free Standing ambulatory surgical center
- ASF - Ambulatory surgical facilities (HAASC & FSASC)
- AMB - Ambulatory setting (OP & HAASC & FSASC)

The findings in the aggregate analysis are discussed in the following major categories:

- Surgical Demand: Volumes
- Surgical Demand: Rates
- Surgical Characteristics
- Surgical Resources
    - Facilities
    - Manpower
    - Relationships to Surgical Demand
- Facility Revenues, Costs, and Prices

Following each of these sections, a concise summary of the major findings contained in that section is presented.

Surgical Demand: Volume

In 1975, over 103,000 surgery cases were treated in health care institutions in Maricopa County. Twenty-five health care institutions provided surgery services to the general population. Twenty-two institutions provided surgical services in IP settings during the year. Of these twenty-two, four are osteopathic facilities — Phoenix General, Mesa General, NHE Community Phoenix, and NHE Community Scottsdale hospitals. Twenty-one facilities performe surgery in OP settings; two hospitals, Phoenix Baptist and Scottsdale Memorial, developed dedicated space for ambulatory surgery and thus provided services in the HAASC settings; and three FSASC settings were available to the population by 1975. Exhibit V-1 presents the inventory of surgical facilities and the surgery volume by setting for each institution in 1975.

Good Samaritan Hospital, the principal institution of the of the Samaritan Health Services corporation, performed the largest number of surgeries of the institutions in Maricopa County with 13.7% of the county's total surgery volume. Surgicenter, Inc., in 1975 after only six years of operations had the fifth largest surgical volume in the area after Good Samaritan, St. Joseph's, Scottsdale Memorial, and Doctors hospitals. Approximately 7.1% of the total surgery volume in Maricopa County during that year was performed at Surgicenter.

Although the inventory is complete for 1975, historical data on the volume of surgeries performed by surgical setting over the time period included in the study could be obtained from only 20 of the 25 facilities in Maricopa County. The 20 facilities represented 90.4% of all surgery cases treated in institutional settings in 1975. The five facilities and their percent of total surgery in 1975 that could not be included in the analysis of surgical demand because of the lack of historical surgical data over the time period are listed below:

- Maricopa County Hospital - 5.5%
- Mesa General Hospital - 1.5%
- NHE Community Hospital, Phoenix - 1.3%
- NHE Community Hospital, Scottsdale - 0.6%
- Valley View Community Hospital - 0.8%

Exhibit V-1

Surgery Volume by Facility and Setting in Maricopa County, 1975

FACILITY / SURGICAL SETTING	IP		OP		HAASC		FSASC		TOTAL	
	N	%	N	%	N	%	N	%	N	%
Arizona Childrens	1,393	1.8	327	3.1	0	0.0	0	0.0	1,720	1.7
Boswell Memorial	2,931	3.7	226	2.1	0	0.0	0	0.0	3,157	3.0
Chandler Community	402	0.5	5	1/	0	0.0	0	0.0	407	0.4
Desert Samaritan	4,080	5.1	1,167	11.1	0	0.0	0	0.0	5,247	5.1
Doctors'	6,152	7.8	1,404	13.3	0	0.0	0	0.0	7,556	7.3
Glendale Samaritan	853	1.1	161	1.5	0	0.0	0	0.0	1,014	1.0
Good Samaritan	12,625	15.9	1,594	15.1	0	0.0	0	0.0	14,219	13.7
John C. Lincoln	3,655	4.6	410	3.9	0	0.0	0	0.0	4,065	3.9
Maricopa County	4,657	5.9	1,046	9.9	0	0.0	0	0.0	5,703	5.5
Maryvale Samaritan	3,101	3.9	1,276	12.1	0	0.0	0	0.0	4,377	4.2
Memorial	1,543	1.9	285	2.7	0	0.0	0	0.0	1,828	1.8
Mesa General	1,519	1.9	0	0.0	0	0.0	0	0.0	1,519	1.5
Mesa Lutheran	6,171	7.8	635	6.0	0	0.0	0	0.0	6,806	6.6
NHE Community, Phoenix	1,166	1.5	144	1.4	0	0.0	0	0.0	1,310	1.3
NHE Community, Scottsdale	514	0.6	64	0.6	0	0.0	0	0.0	578	0.6
Phoenix Baptist	3,544	4.5	150	1.4	1,895	39.9	0	0.0	5,589	5.4
Phoenix General	4,554	5.7	5	1/	0	0.0	0	0.0	4,559	4.4
St. Joseph's	9,092	11.5	1,001	9.5	0	0.0	0	0.0	10,093	9.7
St. Lukes	4,120	5.2	345	3.3	0	0.0	0	0.0	4,465	4.3
Scottsdale Memorial	5,699	7.2	11	0.1	2,858	60.1	0	0.0	8,568	8.3
Tempe Community	868	1.1	166	1.6	0	0.0	0	0.0	1,034	1.0
Valley View Community	718	0.9	104	1.0	0	0.0	0	0.0	822	0.8
Arizona Medical Plaza	0	0.0	0	0.0	0	0.0	918	10.2	918	0.9
Phoenix Surgical Facilities	0	0.0	0	0.0	0	0.0	716	8.0	716	0.7
Surgicenter, Inc.	0	0.0	0	0.0	0	0.0	7,326	81.8	7,326	7.1
TOTALS[2]	79,357	100.0%	10,526	99.7%	4,753	100.0%	8,960	100.0%	103,596	100.0%

[1] Less than 0.1%

[2] May not add to 100% due to rounding.

Source: Reports from individual facilities; Arizona Department of Health Services, Annual Survey of Health Care Institutions, 1976; primary data collection at selected facilities.

Maricopa County Hospital is a county-owned facility that provides health services to the indigent population in the county. Although its surgical volume is relatively high (5703 surgery cases in 1975) with a significant amount of outpatient surgery performed (over 18%), it is apparent that the hospital serves a somewhat specific population that would not otherwise be treated at other institutions in the county. Because of the lack of a Medicaid program in Arizona, services to the indigent population are concentrated at Maricopa County Hospital as part of the county welfare program.

Mesa General Hospital is a relatively small osteopathic hospital located in Mesa, Arizona, a suburb of the Phoenix area. In 1975, Mesa General reported no outpatient surgeries among its 1519 surgical cases. This low frequency of outpatient cases corresponds to the low frequency of outpatient surgery experienced by Phoenix General Hospital, the other major osteopathic institution in Maricopa County.

The three remaining institutions that were excluded from the analysis because of lack of data availability are small facilities that combined make up less than three percent of the surgical volume in Maricopa County. The two NHE institutions are osteopathic facilities.

A second set of facilities designated as "primary impact institutions" was also selected for more intensive analysis and detailed information on surgery volumes, service characteristics, and revenues and expenses was collected. The primary impact institutions included:

- Surgicenter
- Good Samaritan Hospital
- St. Joseph's Hospital
- St. Lukes Hospital
- Memorial Hospital
- Phoenix Baptist Hospital
- Scottsdale Memorial Hospital

The 20 facilities included in the analysis of surgical volume and the seven impact institutions represented 90.4% and 50.3% of the total surgical volume in 1975. Exhibit V-2 presents a comparison of the 20 institutions included in surgical volume analysis and the seven primary impact institutions with the surgical volume by setting of all 25 facilities in Maricopa County. (Several other institutions were approached, but either declined or were unable to participate as primary impact institutions.)

As can be seen by the exhibit, the distribution of surgical volume by setting for the 20 facilities closely parallels the distribution for all facilities. The primary impact facilities are less representative, with surgeries performed in HAASC and FSASC settings over represented in the sample. The OP setting is under represented in the seven impact facilities due to the fact that some impact facilities experienced declines in OP surgery volumes while Phoenix Baptist and Scottsdale Memorial phased out their OP surgery settings in favor of HAASC settings in an effort to maintain or increase their ambulatory surgery case loads.

Change In Surgical Volume By Setting in Maricopa County. The total number of surgeries performed in the 20 facilities, representing 90.4% of the total surgical volume in 1975, increased by 65.6% between 1967 and 1975. This increase in surgical volume was accompanied by an equally important shift in distribution of surgeries across surgical settings as shown in Exhibit V-3. The volume of surgeries performed in each setting is presented graphically in Exhibit V-4. The total surgical volume rose rapidly with an average increase of 5120 surgeries per year over the nine-year time period. The increase was somewhat more pronounced in the 1970s than in the late sixties although a noticeable leveling off in the rate of increase was observed between 1974 and 1975.

The surgical volume in the IP setting increased each year with the exception of 1975 when a 3.4% decline in the IP volume was experienced. Over the total time period, the IP setting increase was considerably less rapid than the increase in total surgeries. The surgical volume in the OP setting has shown two very interesting fluctuations in the time period included in the evaluation. After small but consistent increases between 1967 and 1968, the OP setting surgical volume dropped in 1970 from 5195 cases in 1969 to 4415 cases in 1970 - a 15% decrease. This decline in the OP setting volume in 1970 occurred at the same time as the opening of Surgicenter, Inc., the first FSASC in Maricopa County. After 1970, the OP setting volume steadily rose with a somewhat larger increase between 1974 and 1975 when the surgical volume in the OP setting increased by 23.8%,

Exhibit V-2

Comparison of Representation and Distribution of Surgery Volume by Setting for 25, 20 and Seven Facilities in Maricopa County, 1975

Representation and Distribution	Number of Facilities	Surgical Setting				TOTAL
		IP	OP	HAASC	FSASC	
% Distribution by Setting	25	76.6%	10.2%	4.6%	8.6%	100.0%
% Distribution by Setting	20	75.6%	9.8%	5.1%	9.6%	100.1%
% Distribution by Setting	7	70.3%	6.5%	9.1%	14.1%	100.0%
% Representation of Setting Volume of Total Volume in Maricopa County	20	89.2%	87.1%	100.0%	100.0%	90.4%
% Representation of Setting Volume of Total Volume in Maricopa County	7	46.1%	32.2%	100.0%	81.8%	50.3%

Source: Same as Exhibit V-1.

Exhibit V-3

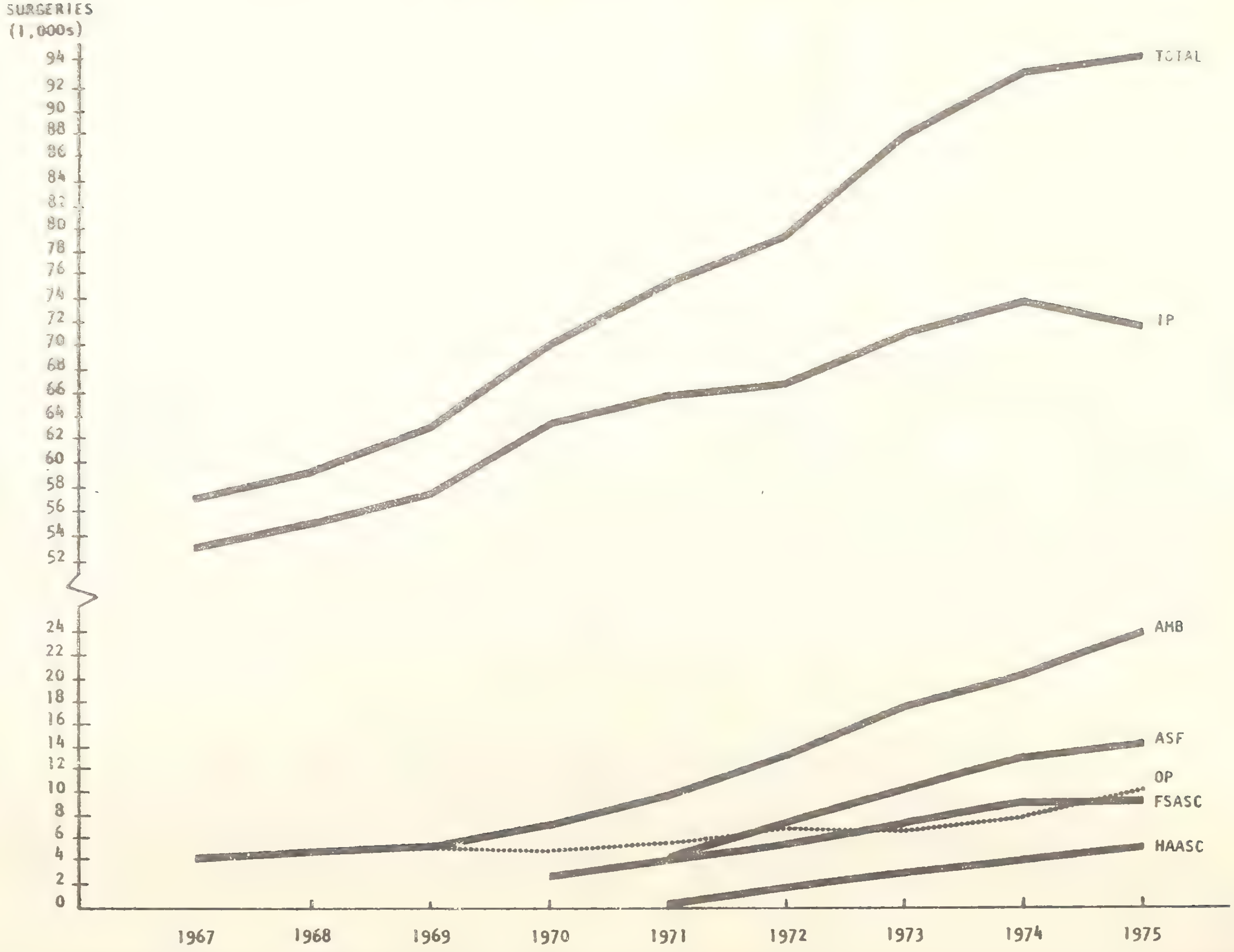
Surgery Volume by Setting at Twenty Facilities, 1967-1975

Year / Surgical Setting	1967		1968		1969		1970		1971		1972		1973		1974		1975	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
IP	52,335	92.5	54,485	92.0	57,227	91.7	62,894	90.2	65,047	87.3	66,127	84.1	70,482	80.8	73,185	79.0	70,783	75.6
OP	4,236	7.5	4,757	8.0	5,195	8.3	4,415	6.3	5,238	7.0	6,233	7.9	6,797	7.8	7,405	8.0	9,168	9.8
HAASC	0	0.0	0	0.0	0	0.0	0	0.0	235	0.4	1,287	1.6	2,578	3.0	3,723	4.0	4,753	5.1
FSASC	0	0.0	0	0.0	0	0.0	2,409	3.5	3,981	5.3	5,038	6.4	7,316	8.4	8,373	9.0	8,960	9.6
TOTAL	56,571	100.0	59,242	100.0	62,422	100.0	69,718	100.0	74,501	100.0	78,685	100.0	87,173	100.0	92,686	100.0	93,664	100.0
ASF	0	0.0	0	0.0	0	0.0	2,409	3.5	4,216	5.7	6,325	8.0	9,894	11.3	12,096	13.1	13,713	14.6
AMB	4,236	7.5	4,757	8.0	5,195	8.3	6,824	9.8	9,454	12.7	12,558	15.9	16,691	19.1	19,501	21.0	22,881	24.4

Source: Primary data collection at individual facilities.

Exhibit V-4

Surgery Volume by Setting at 20 Facilities, 1967-1975



Source: Primary data Collection at Individual Facilities the largest percentage increase in any year included in the evaluation. This increase occurred at the same time a decrease in the IP surgical volume was observed. By 1975, surgeries performed in the OP setting represented 9.8% of the total case load in Maricopa County - up from 7.5% in 1967.

The first surgeries in the HAASC setting in Maricopa County were performed in 1971 when Scottsdale Memorial Hospital opened its ambulatory surgical facility across the street from its downtown Scottsdale location. Phoenix Baptist Hospital added to the HAASC surgical volume in 1973 when its ambulatory surgical center began providing surgical services. The locations of the two HAASCs may be seen as "bracketing" the center city Phoenix area. Scottsdale Memorial is located to the east of Phoenix while Phoenix Baptist is located in the north west Phoenix area. The surgery volume grew rather slowly at the HAASC setting, rising by an average of 1147 cases per year between 1971 and 1975. By 1975, surgeries performed in HAASC settings made up 5.1% of the total surgery volume in the county.

The increase in surgical volume at the FSASC settings was substantially larger than the growth experienced by the HAASC's. By the end of 1970, Surgicenter performed 3.5% of all surgeries in the county. This share of the surgical services in Maricopa County was achieved after just ten and one-half months of operation. It took the two HAASC settings combined more than two years to reach a comparable position with respect to the proportion of the total surgeries in the county. Aided by the opening of two other FSASC settings in 1973, Arizona Medical Plaza and Phoenix Surgical Facilities, 9.6% of all surgeries in the county in 1975 were performed in the FSASC setting. The growth of the FSASC surgery volume began to level off in 1975 with an increase of less than 600 cases between 1974 and 1975.

Taken together, the HAASC and FSASC settings had a remarkable impact on the redistribution of surgery cases among settings. In 1967, no surgery was performed in ASF settings. By 1975, 14.6% of all surgeries in Maricopa County was performed in the five ambulatory surgical facilities. In 1967, only 7.5% of all surgery was performed on an ambulatory basis. This proportion had more than tripled to 24.4% by 1975 with almost two-thirds of the ambulatory surgery performed in specialized facilities specifically designed and built for that purpose.

The percent distribution of surgery volume by setting for the 20 facilities is shown in Exhibit V-5. The most apparent trend in the proportional distribution is the consistent decline in the IP setting percent, particularly after 1969, and the corresponding increase in the AMB proportion during the same period. Closer inspection of the distributions by year reveals additional insight into the dynamics of this important shift. In 1970, the year the first FSASC opened, a decline in both the proportion of IP and OP surgeries was experienced in the county. The decline, as previously noted, was particularly severe for the OP setting where a decrease in the volume of surgery cases was also observed. It would appear that the immediate impacts of the introduction of the FSASC was a sharp and sudden substitution of cases from the OP setting to the FSASC setting with some minor shift out of the IP setting. As may be seen from the exhibit, the OP setting began to regain its position, however, with both increasing volume and an increasing proportion of total surgical services after 1970. However, during the 1970s, the FSASC, HAASC and OP settings all increased in both the volume and proportion of surgery performed. It is apparent that while the immediate impact of the FSASC was the shift from OP settings, the longer term impact was the substitution out of IP settings to FSASC, HAASC and OP settings throughout the county. In order to describe the differences between the trends in surgical volume, measures of change in the volume of surgery by setting are presented in Exhibit V-6 for three periods:

- Total period: 1967-1975
- Before FSASC: 1967-1969
- After FSASC: 1970-1975

All trends for all periods, as computed from the least squares line using the ordinary least squares method, are positive and significantly different from zero at the 5% level of significance.[3] It should be noted that only three years of surgery volume data were available for the "before FSASC" period and, therefore, interpretation of trends for that period should be viewed with caution. It may be seen in the comparison of the before 1970 and after 1970 trends in the total surgical volume that the growth rate in surgical volume after 1970 was higher than in the period prior to 1970 (5222 versus 2925 average yearly increase

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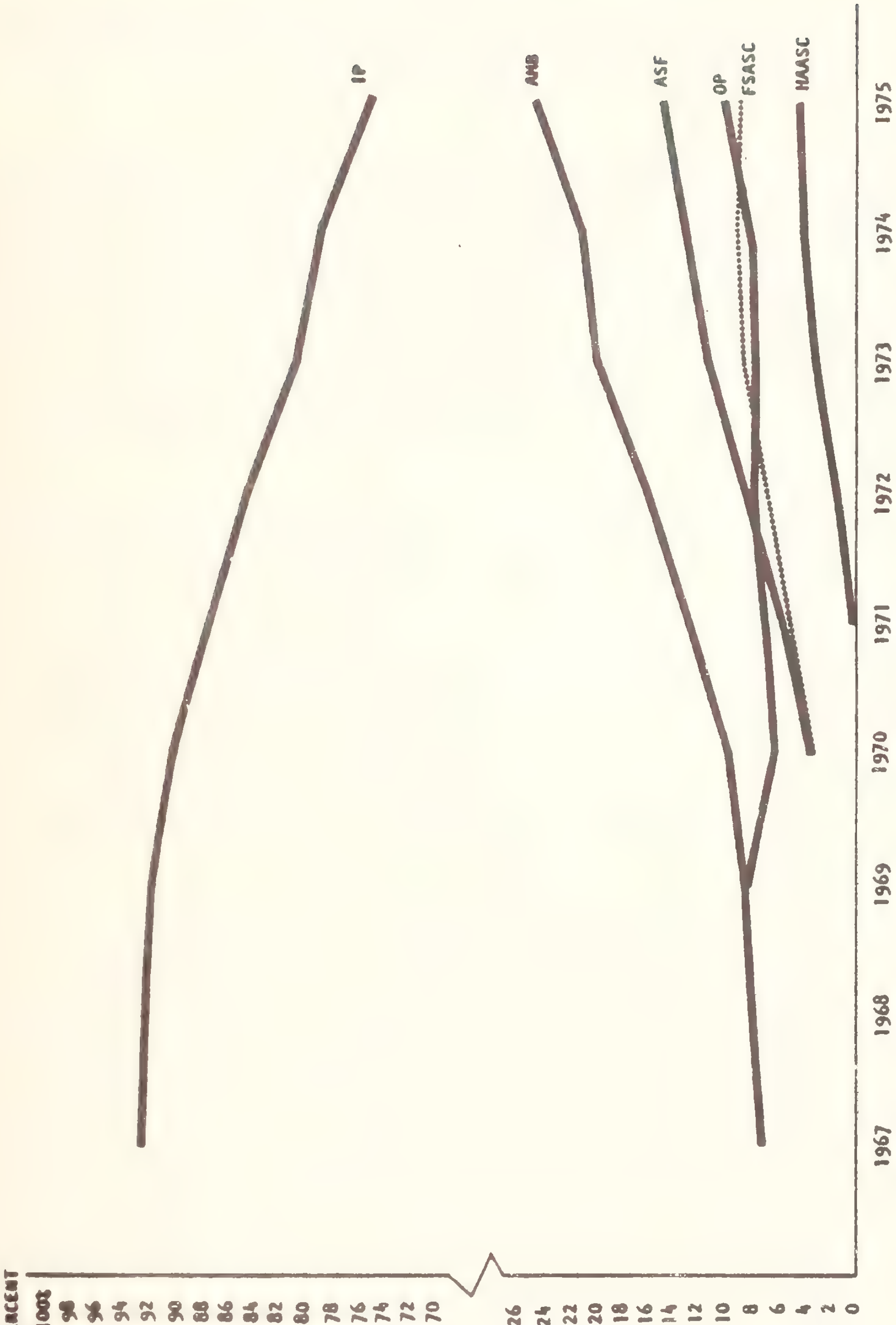
[3] Mordecai Ezekiel, Methods of Correlation Analysis, 2nd ed., John Wiley & Sons, Inc., New York, 1953, pages 59-74.

Exhibit V-5

Percent Distribution of Surgery Volume by Setting at 20 Facilities, 1967-1975



Source: Primary Data Collection at Individual Facilities

Exhibit V-6

Test of Significance for Annual Changes in Surgery Volume by Setting, for 20 Facilities, 1967-1975

Period and Setting / Change	Number of Years	Percent Change	Slope	Intercept	r	5% Signifi-nance
TOTAL PERIOD: 1967-1975						
IP	9	35.2	2,660	50,315	.971	Yes
OP	9	116.4	545	3,214	.920	Yes
HAASC	—	—	—	—	—	—
FSASC	—	—	—	—	—	—
TOTAL	9	65.6	5,120	49,365	.992	Yes
ASF	—	—	—	—	—	—
AMB	9	440.2	2,459	- 951	.970	Yes
BEFORE FSASC: 1967-1969						
IP	3	9.3	2,446	49,790	.998	Yes
OP	3	22.6	480	3,770	.999	Yes
HAASC	—	—	—	—	—	—
FSASC	—	—	—	—	—	—
TOTAL	3	10.3	2,925	53,561	.999	Yes
ASF	—	—	—	—	—	—
AMB	3	22.6	480	3,770	.999	Yes
AFTER FSASC: 1970-1975						
IP	6	12.5	1,949	6,126	.917	Yes
OP	6	107.7	881	3,450	.984	Yes
HAASC	5	1,922.5	1,147	926	.999	Yes
FSASC	6	271.9	1,377	1,192	.988	Yes
TOTAL	6	34.3	5,222	64,461	.985	Yes
ASF	6	469.2	2,392	264	.994	Yes
AMB	6	235.3	3,273	3,196	.998	Yes

Source: Previous Exhibits

in surgeries per year). This difference in the growth rate between the two periods was not attributable to changes in the IP surgery volume which grew less fast after 1970 than before 1970 (1949 versus 2446 average yearly increase in surgeries per year). Rather, the change was attributable to increases in the volumes of AMB surgery which went from an average increase of 480 surgeries per year in the 1967 to 1969 period to an average increase of 3273 surgeries per year in the 1970-1975 period. Of the change in the average yearly increase between the two periods, increases in the volume of surgeries at the FSASCs made up most of the increase.

Change In Surgical Volume By Setting For Impact Institutions

When the distributions of surgery volume are examined for the seven principal impact institutions, patterns similar to, but more pronounced than, those for all of Maricopa County facilities emerge in the increase in surgical volume and the shifts among surgical settings. The total number of surgeries performed at the impact institutions increased by 52.3% between 1967 and 1975. Exhibit V-7 presents the surgery volume and percent distribution by setting for the impact institutions. The volume and percent distribution of surgeries by setting is shown graphically in Exhibits V-8 and V-9.

At the impact institutions, the IP setting surgery volume increased rapidly between 1967 and 1970 and then declined in 1971 with a gradual increase through 1974 and a 3.6% decline experienced between 1974 and 1975. For three of the five years after 1970, IP surgery volume was less than the volume in 1970. Surgery performed in OP settings at the impact hospitals peaked in 1969, then fell by 35.6% in 1970 and did not reach the 1969 surgery volume level by the end of the evaluation period. Surgery performed in ASF settings increased by 401.6% between 1970 and 1975, with the FSASC setting growing by 204.2% in total volume for that period and the volume for HAASC settings increasing by 269.3% between 1972 (the first full year of operation for the Scottsdale Memorial Facility) and 1975.

Exhibit V-10 presents selected measures of change in the volume of surgeries by setting at the impact institutions for the three periods. It may be seen that for the three years prior

Exhibit V-7

Surgery Volume by Setting at Seven Primary Impact Facilities, 1967-1975

Year / Surgical Setting	1967		1968		1969		1970		1971		1972		1973		1974		1975	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
IP	31,039	90.8	31,969	90.1	33.771	90.2	37.584	88.7	36,214	83.6	36.595	78.7	37.795	75.0	37.979	73.7	36.623	70.3
OP	3.155	9.2	3,509	9.9	3.679	9.8	2,369	5.6	2,893	6.7	3.575	7.7	3,436	6.8	2,907	5.6	3.386	6.5
HAASC	0	0.0	0	0.0	0	0.0	0	0.0	235	0.5	1,287	2.8	2,578	5.1	3,723	7.2	4,753	9.1
FSASC	0	0.0	0	0.0	0	0.0	2,409	5.7	3,981	9.2	5,038	10.8	6.574	13.1	6,935	13.5	7,326	14.1
TOTAL	34,194	100.0	35,478	100.0	37,450	100.0	42,362	100.0	43,323	100.0	46,495	100.0	50,383	100.0	51,544	100.0	52,088	100.0
ASF	0	0.0	0	0.0	0	0.0	2,409	5.7	4,216	9.7	6,325	13.6	9,152	18.2	10,658	20.7	12,079	23.2
AMB	3.155	9.2	3,509	9.9	3.679	9.8	4,778	11.3	7,109	16.4	9.900	18.3	12,588	25.0	13,565	26.3	15,465	29.7

Source: Primary Data Collection at Individual Institutions

Exhibit V-8

Surgery Volume by Setting at Seven Impact Facilities, 1967-1975

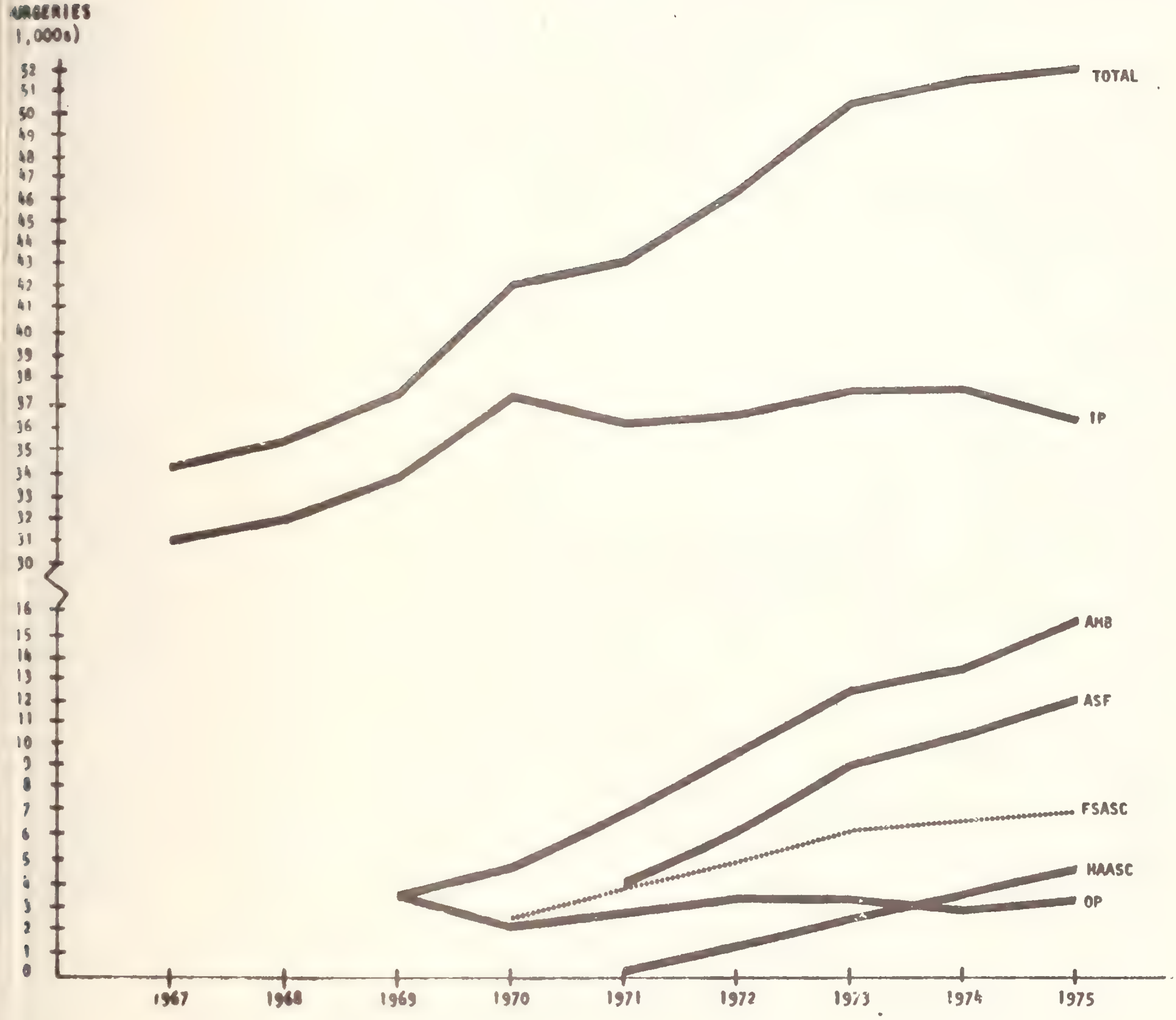


Exhibit V-9

Percent Distribution of Surgery Volume at Seven Primary Impact Facilities, 1967-1975

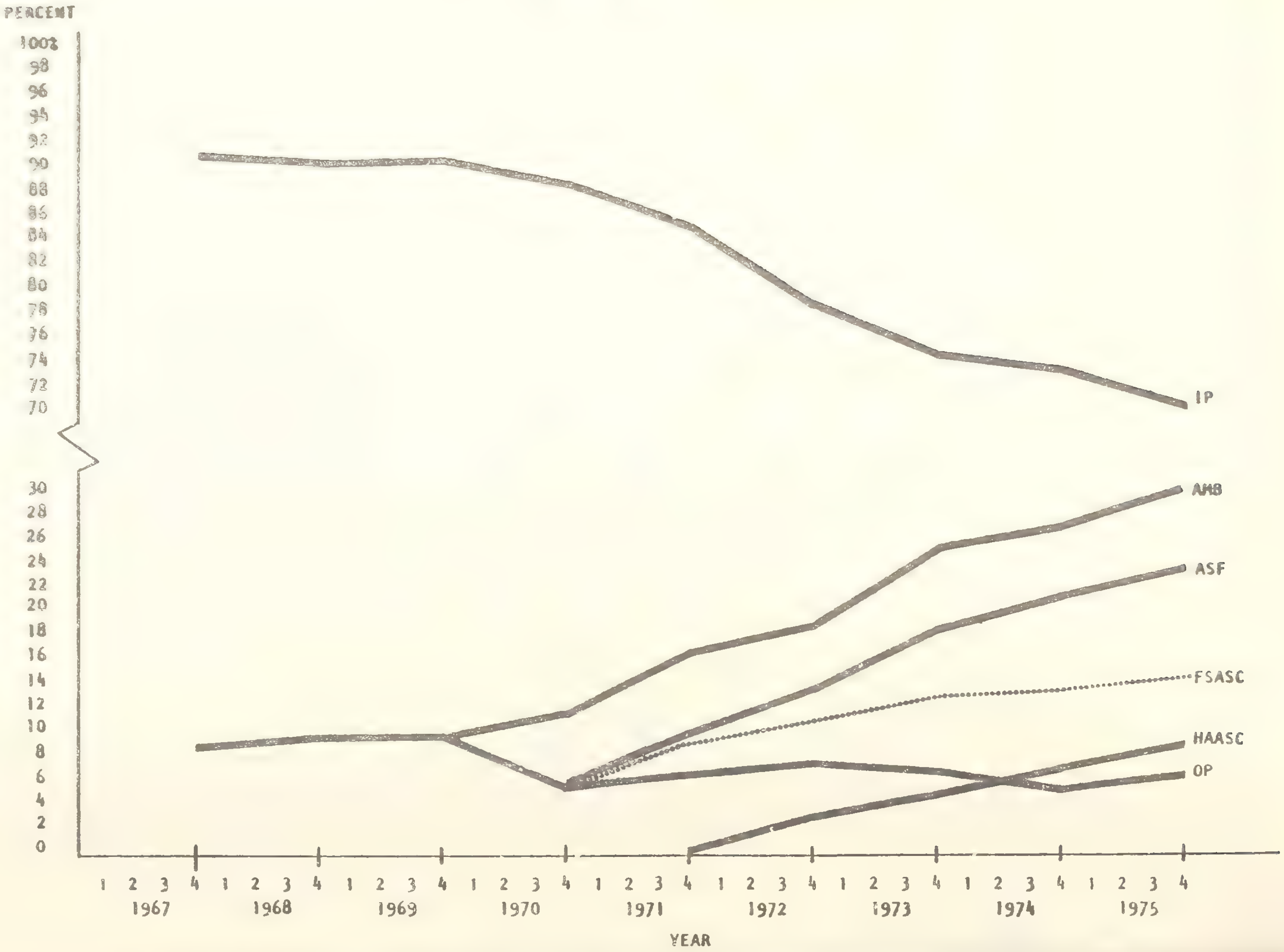


Exhibit V-10

Tests of Significance for Annual Changes in Surgery Volume by Setting at Seven Primary Impact Institutions 1967-1975, 1967-1969, and 1970-1975

iod d ting / Change	Number of Years	Percent Change	Slope	Intercept	r	5% Significance
AL PERIOD: 7-1975						
IP	9	17.1%	794	31,468	.82	Yes
OP	9	8.7	- 2	3,197	- .01	No
HAASC	—	—	—	—	—	—
FSASC	—	—	—	—	—	—
TOTAL	9	52.3	2,502	31,106	.99	Yes
ASF	—	—	—	—	—	—
AMB	9	390.3%	1,709	- 365	.97	Yes
ORE FSASC: 67-1969						
IP	3	8.1%	1,366	29,518	.98	No
OP	3	20.1	318	2,800	.97	No
HAASC	—	—	—	—	—	—
FSASC	—	—	—	—	—	—
TOTAL	3	9.8	1,684	32,319	.98	No
ASF	—	—	—	—	—	—
AMB	3	20.1	318	2,800	.97	No
TER FSASC: 70-1975						
IP	6	-3.3%	107	36,652	.18	No
OP	6	48.5	148	2,541	.57	No
HAASC	4	269.3	1,154	2,110	.99	Yes
FSASC	6	204.2	1,001	1,890	.97	Yes
TOTAL	6	22.5	2,269	39,639	.96	Yes
ASF	6	201.5	2,012	439	.99	Yes
AMB	6	228.4	2,164	2,978	.99	Yes

to the introduction of the FSASC, the number of surgeries was increasing at approximately 1684 additional surgeries per year with IP surgeries contributing more than eighty percent of each yearly increase. After 1970, the number of surgeries continued to increase at approximately 2269 additional surgeries per year. In this later time period, IP surgeries contributed very little to this average annual increase (107 surgeries per year) with surgeries performed in ASF settings making up almost all of each year's increment as computed by the least squares line. As reflected in the surgical volume data for the impact institutions, the slope of the least squares line for OP surgeries in the 1970 to 1975 period is less than the slope for the 1967 to 1969 period (148 versus 318 additional surgeries per year respectively).

The changes in the percent distribution of surgery volume by setting over the time period 1967 through 1975 reveals that the proportion of surgery performed in IP settings declined significantly over the period with a consequent increase in the proportion of surgery performed in ambulatory settings, particularly ASF settings. Between 1967 and 1975, the proportion of total surgery done in IP and OP settings declined from 90.8% and 9.2% to 70.3% and 6.5% respectively. The proportion of surgery done in AMB settings increased from 9.2% in 1967 to 29.7% in 1975. The share of the total surgery performed in the FSASC setting at impact institutions increased from 5.7% in 1970 (the first year of operation) to 14.1% in 1975. The two HAASC settings taken together made up 9.1% of the surgery volume in 1975.

The decline in the proportion of IP surgeries and the increase in the proportion of AMB surgeries supported by the substantial changes in the slopes of IP and OP surgeries in the before-FSASC period and after-FSASC period provide evidence that substitution of ASF settings for IP and OP settings was occurring at the impact institutions in the 1970 to 1975 period. It would appear that, as far as the impact institutions were concerned, the concept and utilization of dedicated space for ambulatory surgery as manifested in the HAASC and FSASC settings resulted in a decided shift in the location of surgeries from the traditional main operating rooms of the hospitals to the ambulatory surgical facilities. It may be concluded from the examination of changes in the surgical volume by setting that the expansion of ASF surgery contributed to the prevention of a continued expansion of IP surgery volume after 1970.

The data for the time period show that a major increase in total surgery occurred between 1969 and 1970, which was principally the result of a sharp increase in IP surgery in 1970. IP surgery rose by 3813 procedures, more than eleven percent, between 1969 and 1970. Surgery performed in AMB settings increased by only 1099 procedures. Although the Surgicenter performed 2409 procedures in 1970, its first year of operation, this was accompanied by a decline in the number of surgeries performed in traditional hospital outpatient settings from 3679 procedures in 1969 to 2369 procedures in 1970.

Therefore, based on the distribution of surgeries by setting observed for 1969 and the offsetting changes in volume between the OP and FSASC settings in 1970, approximately 54% of the increase in the surgeries performed in the first year at the Surgicenter may be accounted for by shifts from the OP setting at the impact institutions.

Changes in Surgical Demand for Specific Facilities in 3 areas of Maricopa County. When the surgical volumes of individual institutions are examined for the time period, it can be readily seen which institutions were the most severely affected as a result of the shift in the distribution of surgeries among settings in the year the first FSASC was opened. (This analysis proceeds on the basis of 3 specific geographic areas.) Exhibit V-II presents the volume data by year for seven facilities in the downtown area of Phoenix closest to where Surgicenter is located. (It should be noted that these are the hospitals closest to Surgicenter, and include two institutions that could not be included as primary impact institutions.) Surgicenter is located directly across the street from Good Samaritan Hospital in the middle of the major medical trade area in Phoenix. It is apparent from the data that most of the losses in surgery volume by setting were concentrated at St. Joseph's and Good Samaritan hospitals. These two institutions alone lost 1407 OP surgery cases between 1969 and 1970 which accounts for 58.4% of the surgical volume handled by the Surgicenter during its first year. Exhibit V-12, shows the volume of outpatient surgeries by month at these two institutions with the sharp decline occurring in January and February of 1970 corresponding with Surgicenter's opening on February 12, 1970. The decline in OP surgery volume at these institutions was not permanent however. Both facilities experienced increases in OP volume after 1970. Good Samaritan exceeded previous levels of OP surgery by 1973 but St. Joseph's, although the OP volume increased after 1971, never returned to pre-1970 OP volume levels.

Exhibit V-11

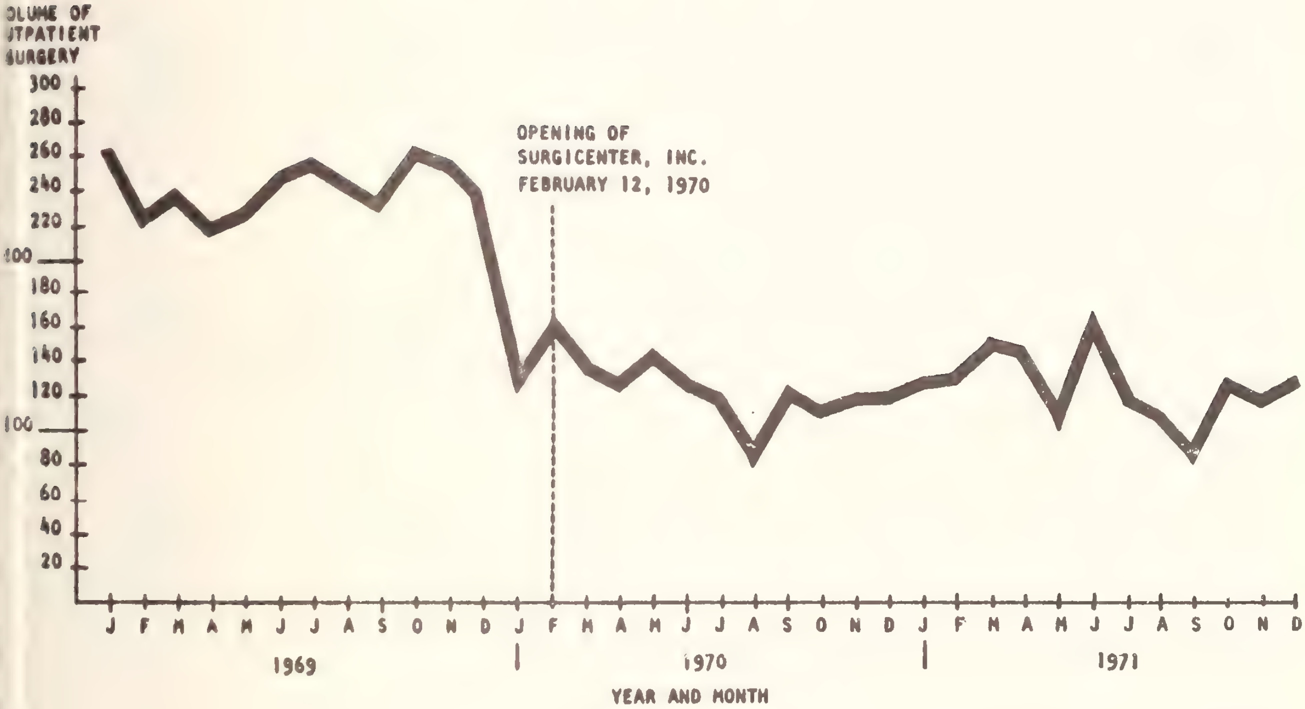
Surgery Volume by Setting for Seven Surgical Facilities in Central Phoenix, 1967-75*

Facility & Setting	Year	1967		1968		1969		1970		1971		1972		1973		1974		1975	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Doctor's	IP	4,202	94.7	4,492	93.3	4,767	91.8	5,252	88.9	4,979	90.4	4,942	90.0	4,905	90.0	6,137	86.8	6,152	81.4
	OP	235	5.3	323	6.7	426	8.2	656	11.1	533	9.6	549	10.0	545	10.0	930	13.2	1,404	18.6
	TOTAL	4,437	100.0	4,815	100.0	5,193	100.0	5,908	100.0	5,512	100.0	5,491	100.0	5,450	100.0	7,067	100.0	7,556	100.0
Good Samaritan	IP	11,899	92.0	12,165	91.1	13,624	92.0	13,622	92.7	12,454	91.8	12,194	91.8	12,550	91.3	12,931	90.4	12,625	88.8
	OP	1,040	8.0	1,186	8.9	1,183	8.0	1,065	7.3	1,109	8.2	1,089	8.2	1,201	8.7	1,381	9.6	1,594	11.2
	TOTAL	12,939	100.0	13,351	100.0	14,808	100.0	14,687	100.0	13,563	100.0	13,283	100.0	13,751	100.0	14,312	100.0	14,219	100.0
Memorial	IP	1,922	96.9	1,720	97.0	1,677	95.3	1,554	95.5	1,283	84.2	1,281	60.6	1,393	66.1	1,422	80.5	1,543	84.4
	OP	62	3.1	54	3.0	83	4.7	73	4.6	241	15.8	832	39.4	715	33.9	345	19.5	285	15.6
	TOTAL	1,984	100.0	1,774	100.0	1,760	100.0	1,627	100.0	1,524	100.0	2,113	100.0	2,108	100.0	1,767	100.0	1,828	100.0
Phoenix Surgical Facilities	FSASC	0	-	0	-	0	-	0	-	0	-	0	-	672	100.0	732	100.0	716	100.0
St. Joseph's	IP	10,124	86.8	10,385	86.8	9,948	85.3	12,465	96.7	11,392	96.7	11,626	95.3	11,280	94.7	10,568	93.4	9,092	90.1
	OP	1,536	13.2	1,577	13.2	1,721	14.7	432	3.3	390	3.3	567	4.7	633	5.3	750	6.6	1,001	9.9
	TOTAL	11,660	100.0	11,962	100.0	11,669	100.0	12,897	100.0	11,782	100.0	12,193	100.0	11,913	100.0	11,318	100.0	10,093	100.0
St. Luke's	IP	1,951	86.6	2,197	87.3	2,540	96.2	3,116	97.5	3,645	91.4	3,624	89.9	3,849	89.9	3,895	93.5	4,120	92.3
	OP	303	13.4	320	12.7	101	3.8	79	2.5	341	8.6	408	10.1	434	10.1	273	6.5	345	7.7
	TOTAL	2,254	100.0	2,517	100.0	2,641	100.0	3,195	100.0	3,986	100.0	4,032	100.0	4,283	100.0	4,168	100.0	4,465	100.0
Surgicenter	FSASC	0	-	0	-	0	-	2,409	100.0	3,981	100.0	5,038	100.0	6,574	100.0	6,935	100.0	7,326	100.0
TOTALS	IP	30,098	90.5	30,959	89.9	32,557	90.3	36,009	88.4	33,753	83.7	33,667	79.9	33,977	75.9	34,953	75.5	33,532	72.6
	OP	3,176	9.5	3,460	10.1	3,514	9.7	2,305	5.7	2,614	6.5	3,445	8.2	3,528	7.9	3,679	7.9	4,629	10.0
	HAASC	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	FSASC	0	0.0	0	0.0	0	0.0	2,409	5.9	3,981	9.8	5,038	11.9	7,246	16.2	7,667	16.6	8,042	17.4
	TOTAL	33,274	100.0	34,419	100.0	36,071	100.0	40,723	100.0	40,348	100.0	42,150	100.0	44,751	100.0	46,299	100.0	46,203	100.0
	ASF	0	0.0	0	0.0	0	0.0	2,409	5.9	3,981	9.8	5,038	11.9	7,246	16.2	7,667	16.6	8,042	17.4
	AMB	3,176	9.5	3,460	10.1	3,514	9.7	4,714	11.6	6,595	16.3	8,483	20.1	10,774	24.1	11,346	24.5	12,671	27.4

*These are not the primary impact institutions, but are those closest spatially to Surgicenter.

Exhibit V-12

Volume of Outpatient Surgeries by Month at Two Impact Hospitals, 1969-1971



Source: Monthly Data on OP Surgeries at Good Samaritan and St. Joseph's Hospitals

Doctors' Hospital apparently declined in both IP and OP surgical volumes after 1970, however, began to increase its volumes again by 1974. By 1975, Doctors Hospital was doing 18.6% of its surgery on an outpatient basis—the highest proportion of any hospital in downtown Phoenix.

Between 1969 and 1970, St. Luke's and Memorial hospitals lost small absolute volumes of OP surgery. St. Luke's OP setting decline was actually begun in 1969 when only 3.8% of the surgery cases were performed outpatient compared with 12.7% in 1968. St. Luke's increased OP surgery volumes and proportion to 10.1% by 1973 but then declined to 7.7% in 1975. St. Luke's, apparently in an effort to recapture its declining OP surgery volume, submitted a request to the local health planning agency to develop a HAASC. However, the request was denied in 1977. The inpatient volume at St. Luke's was apparently not affected by the FSASC and increased steadily each year over the time period with a minor discontinuity in 1972.

Memorial Hospital, after losing only a small volume in 1970, made a major effort to expand OP surgery at the facility and by 1972 was handling 39.4% of its cases on an outpatient basis. This activity, however, declined to 15.6% of volume by 1975. Like Good Samaritan and St. Joseph's, Memorial Hospital experienced a decline in IP surgery volume after 1970. By 1975 the IP volume had not regained the 1968 levels.

In the eastern part of the metropolitan area which includes the communities of Scottsdale, Tempe, and Mesa, five institutions were included in the analysis of surgical volume as shown in Exhibit V-13. Scottsdale Memorial Hospital's HAASC opened in the last quarter of 1971 and did not apparently affect in any major way the surgical volumes at facilities in the Scottsdale, Mesa, or Tempe areas. OP surgery volumes increased in Arizona Childrens, Desert Samaritan, Mesa Lutheran, and Tempe Community Hospitals. By 1975 Desert Samaritan was doing 22.2% of its surgical volume on an outpatient basis. Arizona Childrens, Mesa Lutheran and Tempe Community were at 19.0%, 9.3% and 16.1% respectively. With the exception of Arizona Childrens, inpatient surgical volumes generally increased although the proportion of cases handled IP for the area declined steadily as the OP volume increased rapidly.

The impact of Scottsdale Memorial's HAASC appears to have been on the redistribution of cases within its own facility—al-

Exhibit V-13

Surgery Volume by Setting for Facilities in Scottsdale, Tempe, and Mesa, 1967-1975

Facility & Setting / Year		1967		1968		1969		1970		1971		1972		1973		1974		1975	
		#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Arizona Childrens																			
	IP	1,223	100.0	1,281	100.0	1,329	99.8	1,360	97.4	1,368	92.9	1,358	89.5	1,300	86.1	1,297	82.5	1,393	81.0
	OP	0	0.0	0	0.0	3	0.2	36	2.6	104	7.1	160	10.5	209	13.9	275	17.5	327	19.0
	TOTAL	1,223	100.0	1,281	100.0	1,332	100.0	1,396	100.0	1,472	100.0	1,518	100.0	1,509	100.0	1,572	100.0	1,720	100.0
Desert Samaritan																			
	IP	1,953	100.0	2,431	99.7	2,553	98.3	2,852	97.0	3,059	95.1	3,123	94.1	3,839	85.5	4,011	82.1	4,080	77.8
	OP	0	0.0	7	0.3	44	1.7	87	3.0	159	4.9	196	5.9	481	14.5	875	17.9	1,167	22.2
	TOTAL	1,953	100.0	2,438	100.0	2,597	100.0	2,939	100.0	3,218	100.0	3,319	100.0	4,320	100.0	4,886	100.0	5,247	100.0
Mesa Lutheran																			
	IP	3,117	100.0	3,054	99.5	3,332	98.5	3,653	97.4	5,535	96.5	5,566	95.1	5,796	94.8	6,065	93.2	6,171	90.7
	OP	0	0.0	15	0.5	51	1.5	98	2.6	200	3.5	284	4.9	320	5.2	440	6.8	635	9.3
	TOTAL	3,117	100.0	3,069	100.0	3,383	100.0	3,751	100.0	5,735	100.0	5,850	100.0	6,116	100.0	6,505	100.0	6,806	100.0
Scottsdale Memorial																			
	IP	2,815	94.6	3,003	90.2	3,390	87.2	3,975	87.2	4,145	84.0	4,479	74.5	5,076	72.4	5,501	69.6	5,699	66.5
	OP	161	5.4	325	9.1	498	12.8	583	12.8	555	11.2	245	4.1	85	1.2	27	0.3	11	0.1
	HAASC	0	0.0	0	0.0	0	0.0	0	0.0	235	4.8	1,287	21.4	1,847	26.4	2,376	30.1	2,858	33.4
	TOTAL	2,976	100.0	3,328	100.0	3,888	100.0	4,558	100.0	4,935	100.0	6,011	100.0	7,008	100.0	7,904	100.0	8,568	100.0
Tempe Community																			
	IP	754	98.4	808	97.8	822	97.3	805	98.2	805	97.7	772	94.1	1,049	93.6	1,165	89.2	868	83.9
	OP	12	1.6	18	2.2	23	2.7	15	1.8	19	2.3	48	5.9	72	6.4	141	10.8	166	16.1
	TOTAL	766	100.0	823	100.0	845	100.0	820	100.0	824	100.0	820	100.0	1,121	100.0	1,306	100.0	1,034	100.0
TOTALS	IP	9,862	98.3	10,577	96.7	11,426	94.9	12,654	93.9	14,912	92.1	15,298	87.3	17,060	85.0	18,039	81.4	18,211	77.9
	OP	173	1.7	365	3.3	619	5.1	819	6.1	1,037	6.4	933	5.3	1,167	5.8	1,758	7.9	2,306	9.9
	HAASC	0	0.0	0	0.0	0	0.0	0	0.0	235	1.5	1,287	7.4	1,847	9.2	2,376	10.7	2,858	12.2
	FSASC	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	TOTAL	10,035	100.0	10,942	100.0	12,045	100.0	13,464	100.0	16,184	100.0	17,518	100.0	20,074	100.0	22,173	100.0	23,375	100.0
	ASF	0	0.0	0	0.0	0	0.0	0	0.0	235	1.5	1,287	7.4	1,847	9.2	2,376	10.7	2,858	12.2
	AMB	173	1.7	365	3.3	619	5.1	819	6.1	1,272	7.9	2,220	12.7	3,014	15.0	4,134	18.6	5,164	22.1

though over the time period the hospital was rapidly expanding its total surgical volume in both inpatient and ambulatory settings. Scottsdale Memorial had experienced a relatively large and increasing outpatient surgery case load between 1967 and 1970. By 1970, the hospital was performing 12.8% of its surgeries on an outpatient basis—more then four times the proportion of any other facility in the Scottsdale, Mesa, or Tempe areas and almost six times the volume of any of the four other facilities in the area. After the HAASC opened, the OP surgical volume declined sharply at Scottsdale Memorial to less than one percent of all cases by 1975. The HAASC surgical volume increased dramatically, and in 1975, 2858 cases were performed, representing 33.4% of the total surgery volume at the hospital.

In west Phoenix where Phoenix Baptist Hospital opened a HAASC in 1973 on its hospital grounds, the pattern of surgery volume was somewhat different than in the Scottsdale area. The four inpatient facilities in the area had not experienced a consistent growth in IP surgery volume as shown in Exhibit V-14. By 1973 the IP surgery volume had leveled off and began to decline at John C. Lincoln, Maryvale Samaritan, and at Phoenix Baptist. The IP volume at Glendale Samaritan increased between 1973 and 1974, but declined in 1975. OP surgery volume generally increased for all facilities between 1970 and 1975, which the assistant administrator of the facility attributed to competitive pressure from the Phoenix Baptist HAASC. By 1972, the year before the HAASC opened, Phoenix Baptist Hospital was performing 11.3% of its surgeries on an outpatient basis using the main hospital operating rooms. After one year of operation the HAASC performed 15.4% of the surgeries at the hospital. By 1975, the OP surgery volume at Phoenix Baptist had dwindled to 150 surgeries per year, or 2.7% of the total, and the HAASC was handling more than one-third of the hospital's surgery volume. Both Glendale Samaritan and Maryvale Samaritan hospitals in western Phoenix had expanded their OP surgical programs by 1975. Although they do not dedicate space for ambulatory surgery, their outpatient surgery efforts have resulted in 29.2% of the surgeries at Maryvale Samaritan and 15.9% at Glendale Samaritan being done on an outpatient basis. Arizona Medical Plaza is a surgeon owned FSASC which opened in 1973 and in 1975 had a case load of 918—about half the volume of the Phoenix Baptist HAASC.

Exhibit V-15 presents the surgery volume for three facilities not included in the previously described medical service

Surgery Volume by Setting for Five Facilities in West Phoenix, 1967-1975*

Facility & Setting \ Year		1967		1968		1969		1970		1971		1972		1973		1974		1975	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Arizona Medical Plaza	FSASC	0	-	0	-	0	-	0	-	0	-	0	-	70	100.0	706	100.0	918	100.0
Glendale Samaritan	IP	[illegible]	95.3	747	94.7	707	94.1	711	90.7	618	94.9	641	95.0	783	91.0	930	89.6	853	84.1
	OP	39	4.7	42	5.3	44	5.9	73	9.3	33	5.1	34	5.0	77	9.0	108	10.4	161	15.9
	TOTAL	[illegible]	100.0	789	100.0	751	100.0	784	100.0	651	100.0	675	100.0	860	100.0	1,038	100.0	1,014	100.0
John C. Lincoln	IP	2,112	98.2	2,265	98.5	2,356	97.2	2,939	95.6	3,150	94.6	3,131	91.1	3,890	90.3	3,798	89.4	3,655	89.9
	OP	38	1.8	34	1.5	68	2.9	134	4.4	180	5.4	302	8.9	417	9.7	448	10.6	410	10.1
	TOTAL	2,150	100.0	2,299	100.0	2,424	100.0	3,073	100.0	3,330	100.0	3,433	100.0	4,307	100.0	4,246	100.0	4,065	100.0
Maryvale Samaritan	IP	3,423	81.9	3,402	80.8	3,384	79.8	3,214	77.4	3,498	77.4	3,266	77.7	3,392	77.1	3,389	76.4	3,101	70.8
	OP	756	18.1	808	19.2	856	20.2	938	22.6	1,021	22.6	935	22.3	1,010	22.9	1,045	23.6	1,276	29.2
	TOTAL	4,179	100.0	4,210	100.0	4,240	100.0	4,152	100.0	4,519	100.0	4,201	100.0	4,402	100.0	4,434	100.0	4,377	100.0
Phoenix Baptist	IP	2,328	97.8	2,499	98.2	2,591	96.5	2,852	95.4	3,295	92.8	3,391	88.7	3,647	76.8	4,662	71.2	3,544	63.4
	OP	53	2.2	47	1.8	93	3.5	137	4.6	257	7.2	434	11.3	368	7.8	131	2.6	150	2.7
	HAASC	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	731	15.4	1,347	26.2	1,895	33.9
	TOTAL	2,381	100.0	2,546	100.0	2,684	100.0	2,989	100.0	3,552	100.0	3,825	100.0	4,746	100.0	5,140	100.0	5,589	100.0
TOTALS	IP	8,444	90.7	8,913	90.5	9,038	89.5	9,716	88.3	10,561	87.6	10,429	85.9	11,712	81.4	11,779	75.7	11,153	69.9
	OP	886	9.3	931	9.5	1,061	10.5	1,282	11.7	1,491	12.4	1,705	14.1	1,872	13.0	1,732	11.1	1,997	12.5
	HAASC	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	731	5.1	1,347	8.7	1,895	11.9
	FSASC	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	70	0.5	706	4.5	918	5.7
	TOTAL	9,530	100.0	9,844	100.0	10,099	100.0	10,998	100.0	12,052	100.0	12,134	100.0	14,385	100.0	15,564	100.0	15,963	100.0
	ASF	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	801	5.6	2,053	13.2	2,813	17.6
	AMB	886	9.3	931	9.5	1,061	10.5	1,282	11.7	1,491	12.4	1,705	14.1	2,673	18.6	3,785	24.3	4,810	30.1

*These five facilities in West Phoenix are included in the 20 institutions for which data were obtained.

Exhibit V-15

Surgery Volume by Setting at Three Facilities, 1967-1975*

Year / Facility & Setting	1967		1968		1969		1970		1971		1972		1973		1974		1975	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Boswell Memorial																		
IP	0	-	0	-	0	-	115	92.8	1,176	92.8	1,854	92.8	2,391	92.8	2,585	92.8	2,931	92.8
OP	0	-	0	-	0	-	9	7.2	91	7.2	144	7.2	185	7.2	201	7.2	226	7.2
TOTAL	0	-	0	-	0	-	124	100.0	1,267	100.0	1,998	100.0	2,576	100.0	2,786	100.0	3,157	100.0
Chandler Community																		
IP	589	99.8	648	99.8	609	99.8	606	100.0	587	98.7	604	99.0	490	98.0	418	97.7	402	98.8
OP	1	0.2	1	0.2	1	0.2	0	0.0	8	1.3	6	1.0	10	2.0	10	2.3	5	1.2
TOTAL	590	100.0	649	100.0	610	100.0	606	100.0	595	100.0	610	100.0	500	100.0	428	100.0	407	100.0
Phoenix General																		
IP	3,142	100.0	3,388	100.0	3,597	100.0	3,803	100.0	4,058	100.0	4,325	100.0	4,852	99.3	5,411	99.5	4,554	99.9
OP	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	35	0.7	25	0.5	5	0.1
TOTAL	3,142	100.0	3,388	100.0	3,597	100.0	3,803	100.0	4,058	100.0	4,325	100.0	4,887	100.0	5,436	100.0	4,559	100.0

*These three facilities are included in the twenty for which data were collected.

areas. Boswell Memorial is located in Sun City—a retirement community approximately 15 miles north-west of central Phoenix. The hospital serves primarily the Sun City population which is disproportionately older than the total population in Maricopa County. Chandler Community Hospital is located to the southeast of Phoenix in Chandler, Arizona and is a small institution not in a service area of any other facility. Phoenix General is an osteopathic facility located in central Phoenix and does not share staff surgical privileges with the other facilities. Phoenix General opened an HAASC with one operating room in January, 1976 after a period of trying to develop an outpatient surgery program using the main operating rooms that proved to be unsuccessful.

Summary of Findings. From the analysis of surgery volume in Maricopa County for the period 1967 through 1975, several major findings have emerged which relate to the shifts in the distribution of surgery among surgical settings and the substantial increase in the volume of surgery performed in ambulatory settings. The principal findings are summarized as follows:

- The introduction of the Surgicenter in 1970 and the subsequent opening of two additional FSASCs and two HAASCs patterned after the Surgicenter concept seemed to cause a major change in the distribution of surgery among alternative surgical settings in Maricopa County.
- Both the volume and the proportion of surgery performed in ambulatory surgical settings exhibited statistically significant increases over the time period - from 4,236 surgeries, representing 7.5% of all surgeries in 1967 to 22,881 surgeries, representing 24.4% of all surgeries in 1975.
- The volume of surgery performed in inpatient surgical settings showed a significantly smaller percentage increase over the time period 1967 to 1975 (35.2%) than did the ambulatory and the total surgery volumes which increased by 440.2% and 65.6% respectively. As a result, the proportion of surgery performed in an inpatient setting declined from 92.5% in 1967 to 75.6% in 1975 with most of the decline occurring after 1970.
- By 1975, 59.9% of the surgeries performed in ambulatory surgical settings in Maricopa County were performed

in FSASCs and HAASCs. FSASCs performed 39.2% of all ambulatory surgery in the county compared with 20.8% for the HAASCs. The remainder were performed in traditional hospital outpatient settings.

- Of the total increase in ambulatory surgery volume that occurred after 1969, 77.5% of the increase was made up of the increases in surgical volume at the FSASCs and HAASCs.
- Approximately 57% of the surgery performed at the Surgicenter in 1970, its first year of operation, was attributable to a shift in the location of surgery from the hospital outpatient setting. Shifts from hospital inpatient settings contributed to the remainder of the increase in the proportion of surgery performed at the FSASC.
- After a decline between 1969 and 1970 in both the volume and percent of surgery performed in hospital outpatient settings, the volume and percent of hospital based outpatient surgery increased steadily in Maricopa County. By 1975 the outpatient setting surgery volume was 9168 representing 9.8% of all surgeries performed in the county. A larger proportion of surgery was performed in hospital outpatient settings (9.8%) than in either FSASC (9.6%) or HASSC (5.1%) settings.
- The development of HAASCs at the two hospitals in Maricopa County was preceded by relatively high proportions of outpatient surgery at the institutions (as compared with most of the other hospitals in that year, as well as compared with these same 2 hospitals in subsequent years). Scottsdale Memorial Hospital performed 12.8% of its surgeries on an outpatient basis in 1970. Phoenix Baptist Hospital's OP surgeries represented 11.3% of total surgery volume in 1972. The HAASCs were generally patterned and modelled after the FSASC in design and operation.
- After the introduction of the HAASCs, the two hospitals rapidly phased out their outpatient surgery activity that used the hospital's main operating rooms. By 1975, Phoenix Baptist and Scottsdale Memorial were each performing less than 3.0% of their surgery in the traditional hospital outpatient setting.

In the next section of this chapter the changes in the volume of Surgeries by setting relative to the changes in the Maricopa County population are examined.

Surgical Demand: Rates

In the analysis of surgical demand, the surgery rate is an equally important subject for investigation as the change in the volumes of surgeries. It is clear that the size of the population of an area is the dominant variable in the determination of the aggregate number of surgeries performed. Surgery rate is defined as the number of surgery cases per unit time divided by the population. The rates are expressed, for example, as "number of IP surgeries performed at surgical facilities in Maricopa County in 1973 per thousand population of Maricopa County". It was not possible to estimate the surgery rate for all surgeries performed at all institutions in Maricopa County. The surgery rate used in this analysis is based on the number of surgeries performed at the twenty institutions included in the evaluation and thus represents a subset of the total rate for Maricopa County. It is assumed that changes in the surgery rate of the institutions included in the evaluation are representative of the changes that occurred in the total surgery rate for Maricopa County. (It will be recalled from Exhibit V-2 that these 20 facilities perform more than 90% of the surgeries performed in Maricopa County.)

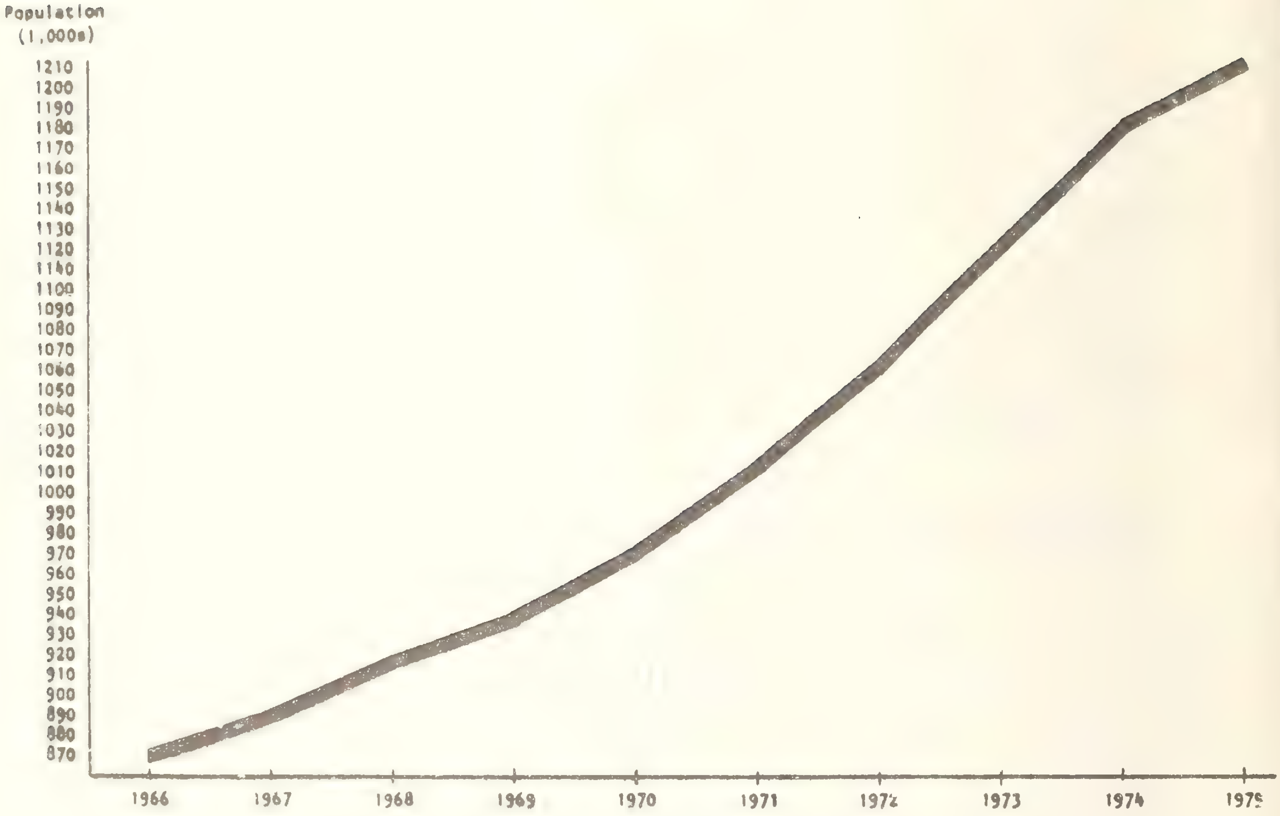
Population Growth in Maricopa County. Maricopa County, in which Phoenix is located, is one of the most rapidly growing metropolitan areas in the United States. Between 1966 and 1975 the population increased by 39.9% from 870,000 to 1,217,500 inhabitants. This population growth is plotted in Exhibit V-16 and exhibits a generally linear trend with a noticeable increase in the rate of population increase after 1969. In general, the rate of population growth after 1969 exceeded the rate experienced in the earlier period.

Change In Surgical Rate By Setting for 20 Facilities. The total surgery rate in Maricopa County, as reflected in the changes for the 20 facilities included in this analysis, increased substantially during the 1967 to 1975 period. The total rate rose sharply in 1970 from 66.0 to 71.8 surgeries per thousand population-the largest single year increase in the nine-year time period. The total rate leveled off somewhat for the years 1971 and 1972 before making another major upward move in 1973 from 73.8 in 1972 to 77.3 surgeries per thousand in 1973—the second largest

Exhibit V-16

Population of Maricopa County, Arizona

1966-1975



yearly increase. The total rate increased somewhat in 1974 before declining from 78.5 in 1974 to 76.9 surgeries per thousand in 1975. Exhibit V-17 presents the yearly surgery rate by setting for the time period. Exhibit V-18 shows the trends in the rates. The trend in total rate is definitely not linear over the time period. Rather, the trend exhibits what may be viewed as two distinct "steps" that moved the rate to the higher levels. The first step occurred in 1970 and lasted until 1972 while the second step occurred in 1973 and lasted at least through the end of the evaluation period.

The IP surgery rate showed an equally non-linear trend over the time period. After increasing it approximately the same rate as the total rate in 1967, 1968, and 1969, the IP rate increased to a high for the nine-year period of 64.8 surgeries per thousand in 1970. This peak was not maintained, however, and the IP rate declined in 1971 and 1972, leveled off in 1973 and 1974 and then made a sharp decline to a low of 58.1 surgeries per thousand population—below the IP rate experienced in 1967. The sharp increase in the IP rate in 1970 corresponded with the first "step" noted for the total rate. The temporary leveling off of the IP rate in 1973 and 1974 occurred at the same time as the second "step" was observed in the total rate.

The OP, FSASC, and HAASC rates all showed statistically significant increases over the time period. The OP rate, corresponding with observed decrease in OP surgery volumes, declined in 1970 but afterward moved steadily upward to a high for the period of 7.5 surgeries per thousand in 1975—higher than the surgery rates for both the FSASC and HAASC settings. The rate for the HAASC setting increased consistently over the period 1971 through 1975 to a high of 3.9, while the FSASC rate slowed in its rate of increase in 1974 and 1975 after four years of rapid growth particularly in the first and second years of the operation of the Surgicenter. The growth rate was attenuated in 1974 and 1975.

When the trends in rates by surgical setting are compared, it is apparent that the increase in the total surgical rate of 5.8 surgeries per thousand observed in 1970 (the first step) was primarily a result of the increase in the inpatient surgical rate. (It should be reiterated at this point that this analysis is presented for twenty impact facilities since the "denominator" being used--Maricopa County population--requires as large a study population as possible.) The increase in rate of the FSASC setting of 2.5 surgeries per

Exhibit V-17

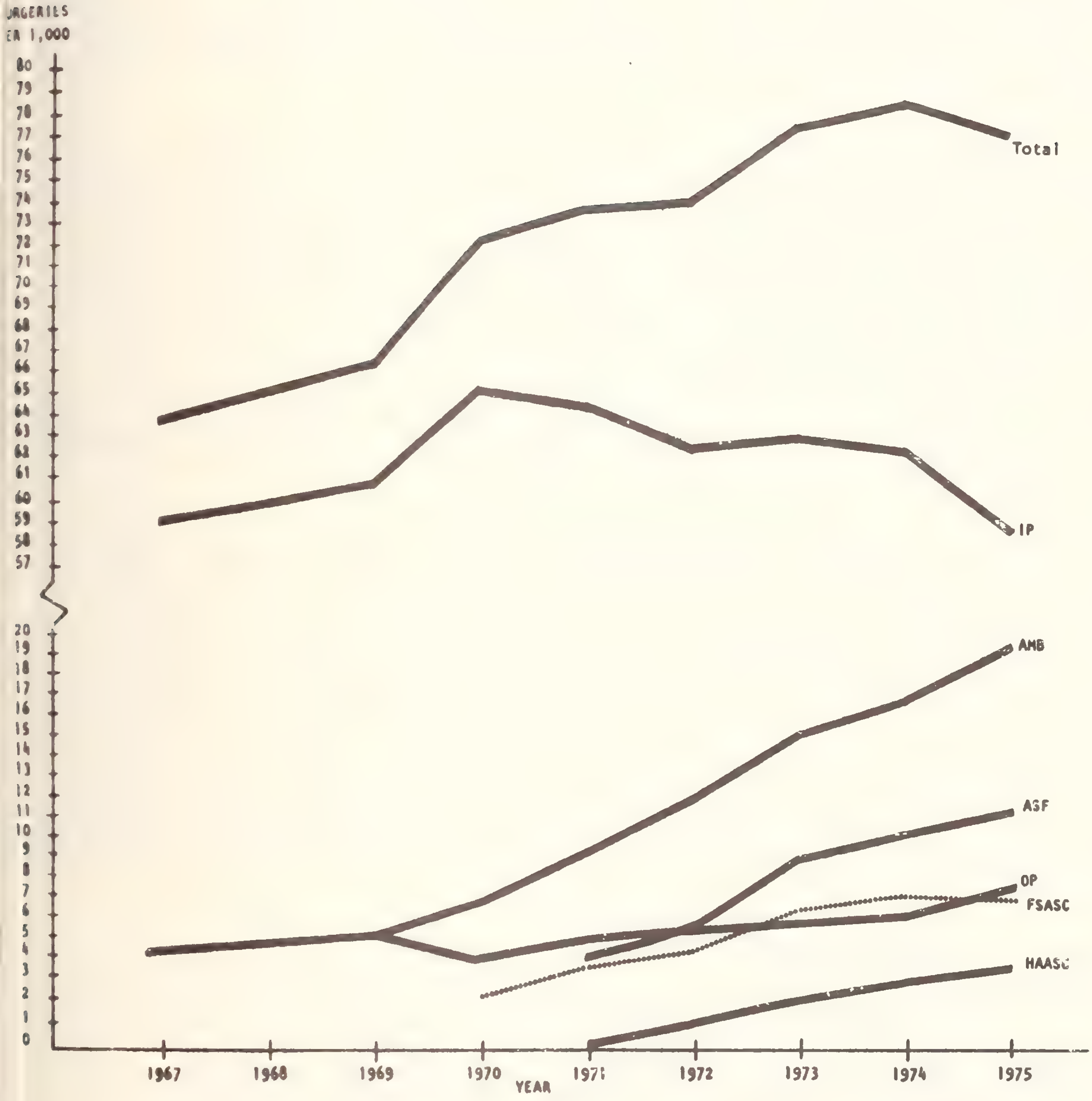
Surgery Rate Per 1,000 Population by Setting for 20 Facilities, 1967-1975

Surgical Setting \ Year	1967	1968	1969	1970	1971	1972	1973	1974	1975
I.P.	58.8	59.6	60.5	64.8	64.1	62.0	62.6	62.0	58.1
OP	4.8	5.2	5.5	4.5	5.2	5.8	6.0	6.3	7.5
HAASC	0.0	0.0	0.0	0.0	0.2	1.2	2.3	3.2	3.9
FSASC	0.0	0.0	0.0	2.5	3.9	4.7	6.5	7.1	7.4
TOTAL	63.6	64.8	66.0	71.8	73.5	73.8	77.3	78.5	76.9
ASF	0.0	0.0	0.0	2.5	4.2	5.9	8.8	10.2	11.3
AMB	4.8	5.2	5.5	7.0	9.3	11.8	14.8	16.5	18.8

Note: Supply rates for the entire U.S. and for the Western Census Region are presented in Exhibit V-20.

Exhibit V-18

Surgery Rate by Setting for 20 Facilities, 1967-1975



thousand in 1970 was partially offset by a drop of 1.0 surgeries per thousand in the OP setting rate. Therefore, almost three quarters of the increase in the total surgery rate was attributable to changes in the inpatient rate which, in turn, was related to changes in other factors which are described in subsequent sections of this report.

The second step increase that occurred in 1973 cannot, however, be attributed to an increase in the IP rate. The IP rate rose by only 0.6 surgeries per thousand compared with the increase of 3.5 for the total rate. The OP rate also increased only very little between 1972 and 1973. The FSASC settings, Surgicenter and the other two facilities, made up the majority of the increase in the total rate with an increase of 1.8 surgeries per thousand. The HAASC setting was also a major component of the increase in the total rate by moving up 1.1 surgeries per thousand in its rate. It should not, however, be inferred that the ambulatory facility caused the increase in surgical rates during this period; the data may represent a shift in the setting of surgeries that would have been performed in any case.

As was observed with the inspection of surgical volumes, two types of setting substitution took place over the time period. In 1970, there was little or no substitution out of IP settings to AMB settings in terms of the surgical rate. The increase in the FSASC rate was offset by declines in the OP rate. This reflects the OP substitution initially from Good Samaritan and St. Joseph's hospitals described previously in terms of surgical volumes. After 1971, however, it is evident that a shift out of IP setting to AMB settings did occur. Surgicenter participated in this substitution in 1971 and 1972, however, it was the introduction of the HAASCs at Phoenix Baptist and Scottsdale Memorial hospitals that captured most of this IP substitution after 1972. The FSASC surgical rate remained relatively constant between 1973 and 1975.

The tests of significance for the changes in the surgery rate by setting for the three time periods are given in Exhibit V-19. There are statistically significant increases in the rates for all settings for all periods with the exception of the IP rate. Over the total time period the slope IP rate was not significantly different from zero at the 5% level of significance. However, in the before-FSASC period, 1967 to 1969, the trend was positive and significant at the 5% level. After 1970, it reversed and

Exhibit V-19

Tests of Significance for Changes in Surgery Rate by Setting at Impact Institutions, 1967-1975, 1967-1969, 1970-1975

Change eriod and Setting	Number of Years	Slope	Intercept	r	5% Significance
OTAL PERIOD: 1967-1975					
IP	9	.097	60.9	.115	No
OP	9	.273	4.3	.833	Yes
HAASC	—	—	—	—	—
FSASC	—	—	—	—	—
TOTAL	9	1.982	61.9	.956	Yes
ASF	—	—	—	—	—
AMB	9	1.888	.969	.977	Yes
EFORE FSASC: 1967-1969					
IP	3	.850	57.9	.999	Yes
OP	3	.350	4.5	.997	Yes
HAASC	—	—	—	—	—
FSASC	—	—	—	—	—
TOTAL	3	1.200	62.4	1.000	Yes
ASF	—	—	—	—	—
AMB	3	.350	4.5	.997	Yes
FTER FSASC: 1970-1975					
IP	6	-1.12	66.2	- .895	Yes
OP	6	.529	4.0	.971	Yes
HAASC	5	.940	- 0.7	.997	Yes
FSASC	6	1.026	1.8	.978	Yes
TOTAL	6	1.257	70.9	.895	Yes
ASF	6	1.85	0.66	.992	Yes
AMB	6	2.389	4.7	.998	Yes

Source: Previous Exhibits

the slope of the IP rate was negative and significantly different from zero at the 5% level.

In general for the Maricopa County area over the years since the introduction of the FSASCs and the HAASCs, it would appear that more surgery per capita was being performed with less and less of it performed in hospital inpatient settings. However, the changes in the surgery volumes and rates indicate that the relationships between the existence of the ASF settings and the increases in the surgery rates are complex and a causal inference may not be warranted. In order to provide more insight into the changes in the surgery rate over the time period, two aspects of relatively long-term trends was examined. These included:

> Secular Increases in Surgery Rates - Secular increases, as reflected in U.S. and regional statistics, are the result of long-term trends in several variables influencing the type and frequency of surgery. Some of these variables may include changes in the practice of medicine, availability of surgical resources such as facilities and manpower and changes in the preferences and health status of the population. The most notable comparisons are that the inpatient surgical rate for Maricopa County was considerably above the inpatient surgical rates for the U.S. and the West for almost the entire time period. Only in 1973 did the inpatient rate for Maricopa County drop below the rate for the West. Exhibits V-20 and V-21 compare inpatient surgical rates for the U.S. and Western census region with the inpatient and total surgical rates experienced by the 20 facilities included in the study. Both inflated and non-inflated rates for Maricopa County are presented in the table. The rates observed for the 20 facilities included in the study were inflated by the ratio of the total surgeries for all facilities in 1975 to the surgeries performed in the 20 facilities to produce an estimate of the total rate for Maricopa County. Between 1968 and 1975 inpatient surgery rates increased in the West by 22.9%, and in the U.S. as a whole by 21.3%. During the same period, the inpatient surgical rates in Maricopa County increased and then declined steadily after 1970 principally due to substitution from the inpatient settings to FSASC and HAASC settings.

Surgery Rates (per 1,000 population) for United States, Western Census Region, and Maricopa County, Arizona, Inpatient and Total, 1968-1975

Year Surgery Rate	1968	1969[3]	1970[3]	1971[3]	1972	1973	1974	1975[4]
United States: Inpatient Setting	56.0	57.5	59.0	60.4	61.9	64.4	66.6	67.9
Western Census Region: Inpatient Setting	54.6	56.3	58.0	59.7	61.4	64.1	65.4	67.1
Maricopa County, 17 Facilities, Inpatient Setting	59.6	60.5	64.8	64.1	62.0	62.6	62.0	58.1
Maricopa County: All Facilities (Estimated)[1] Inpatient Setting	66.7	67.8	72.6	71.9	69.5	70.2	69.5	65.1
Maricopa County: 20 Facilities, All Settings	64.8	66.0	71.8	73.5	73.8	77.3	78.5	76.9
Maricopa County: All Facilities (Estimated)[2] All Settings	71.7	73.0	79.4	81.3	81.6	85.5	86.8	85.1

[1] Rate for 17 facilities inflated by ratio of all inpatient surgeries to inpatient surgeries at 17 facilities in 1975 (1.121).

[2] Rate for 20 facilities inflated by ratio of all surgeries to surgeries at 20 facilities in 1975 (1.106).

[3] Interpolated

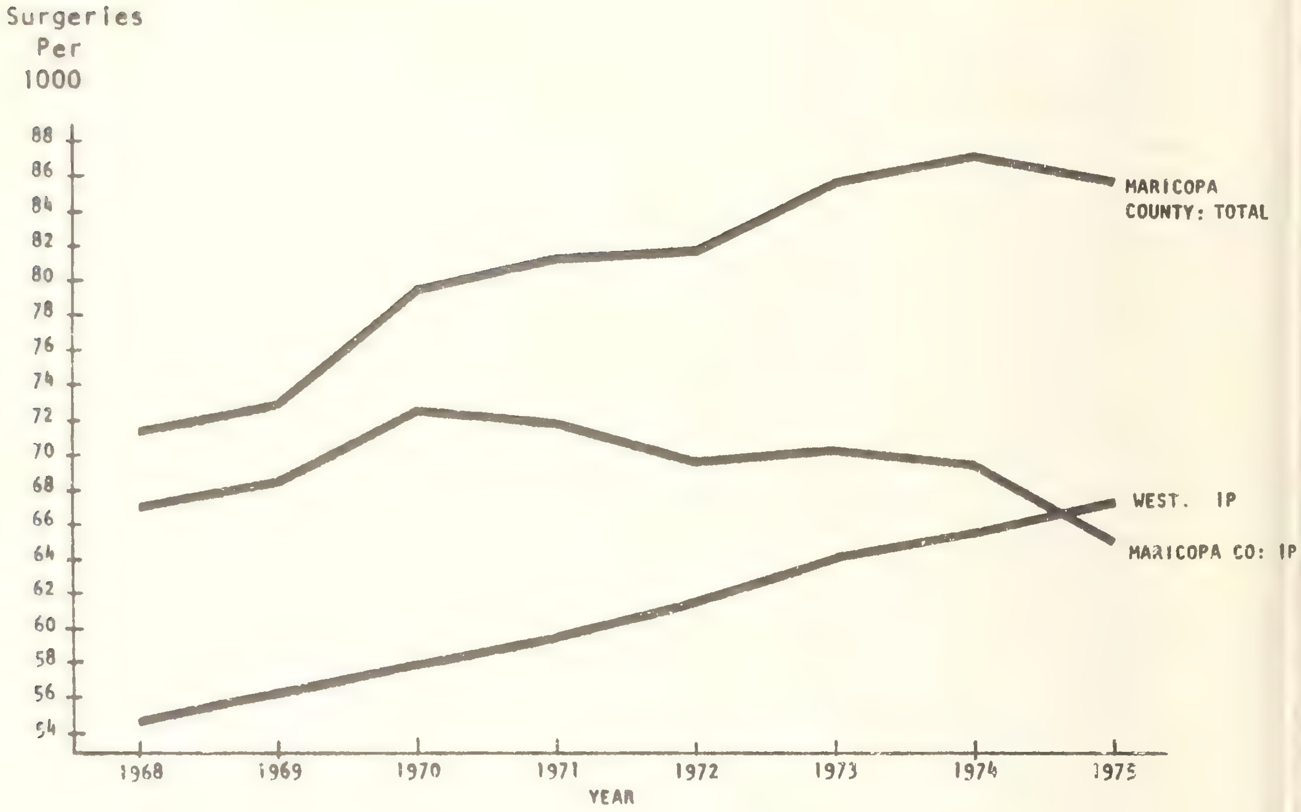
[4] 1975 data is preliminary

Sources: Surgical Operations in Short-Stay Hospitals - United States, Series 13 of Vital and Health Statistics, Data from the National Health Survey, 1968, 1972 and 1973, National Center for Health Statistics.

Utilization of Short-Stay Hospitals: Annual Summary for the United States, 1974. National Center for Health Statistics. Discussions with Mr. Abraham Ranofsky and Ms. Mary Molen, National Center for Health Statistics.

Exhibit V-21

Comparison of Surgery Rates for Western Census Region and Maricopa County, Arizona, Inpatient and Total, 1968-1975



Source: Previous Exhibit

If it is assumed that no major changes in medical practice with regard to the appropriate settings for surgery or the use of outpatient surgical facilities occurred in the Western census region or in the nation as a whole over the time period, then it may be argued that the proportion of surgeries performed in the OP setting to total surgeries in the U.S. has remained relatively constant over the time period. Hence, the changes in the U.S. and Western inpatient surgery rates may consitute good estimates of how the total U.S. and Western surgery rates have changed. If this assumption is not true, and AMB setting surgery rates in the U.S. and the West have increased significantly as a proportion of total surgery over the time period, then the slope of the trend of the inpatient surgical rate would be an underestimate of the slope of the trend of the total surgery rate. If this were the case, then the slope of the total surgery rate for the U.S. and the West may, in fact, exceed the slope of the trend for the total surgery rate in Maricopa County. The total surgical rate in Maricopa County increased by 18.1% between 1968 and 1975. The slope of the total Maricopa County rate is approximately the same as the slope of the inpatient rate in the West indicating that the total surgery rate in Maricopa County is not increasing any faster than is the inpatient surgical rate in the West. The increase in the total surgery rate for Maricopa County is thus consistant with the secular trend in surgery rate observed in the U.S. and West in general. With the introduction of the FSASCs and HAASCs inpatient surgery rates in Maricopa County increased less then did national and Western rates. These comparisons are particularly important. If the introduction of the ASF settings was to have "induced" an increased demand for surgical services, it would have been reasonable to expect that the increase in the surgical rate would have grown faster in Maricopa County than would have the rate in the West where ASFs were generally not present during this period. It is evident from the comparisons of Maricopa County, regional, and national trends that this induced demand effect did not occur or, at least, could not be detected in the changes in the total surgical rate over the eight year period.

Changes in Population Characteristics - The increase in the surgical rate observed for Maricopa County may be partially explained by changes in population characteristics. Between 1970 and 1975, the population of Maricopa County grew by 25.4%. However, this growth was not distributed proportionately across all age categories. The major components of the growth were in two categories: males over 65 years of age, and women between the ages of 15 and 44. The population of the first group increased by 46% between 1970 and 1975 and the second group increased by 32%. Exhibit V-22 presents the surgical rates for the U.S. for four major age groupings as well as for males and females. It can be seen that the two groups with the highest surgery rates, males over 65 and females between 15 and 44, are the two groups that experienced the highest growth rates as components of the Maricopa County population. Children under 15 years of age had the lowest rates of surgery in the U.S. This group in Maricopa County increased in population by only 9% between 1970 and 1975, considerably less than the 25.4% increase for the Maricopa County population as a whole. The disproportionate increase in the population of Maricopa County for the groups that have the highest rates of surgery may have contributed to the generally upward trend in the total rate previously described.

Summary of Findings. With respect to changes in the surgery rate in Maricopa County for the period 1967 through 1975, the principal findings were as follows:

- It does not appear that the introduction of the FSASCs and the HAASCs in Maricopa County resulted in increases in surgery rates above what may have been expected by secular increases in the rate commensurate with increases in the U.S. and the West and with changes in the composition of the population of Maricopa County.

- The increase in the total surgery rate in Maricopa County for the period 1968 to 1975 was approximately equal to the rate of increase of the total surgery rate in the Western census region assuming that the

Exhibit V-22

Inpatient Surgery Rates (per 1,000 population) in the United States by Age and Sex, 1974

Age Group	Male	Female	Both Sexes
Less than 15	47.4	36.7	42.2
15-44	56.8	140.2	99.8
45-64	96.1	136.5	117.3
65 and Over	165.4	132.0	145.9

SOURCE: National Center for Health Statistics, Utilization of Short-Stay Hospitals: Annual Summary for the United States, 1974, op cit.

rate of outpatient to inpatient surgery in the West remained constant over the time period. If the ratio of outpatient to inpatient surgery in the West increased over the time period, the rate of increase in the total surgery rate in the West may in fact have exceeded the rate of increase in Maricopa County.

- The total surgery rate for Maricopa County increased over the time period 1967-1979 by means of two distinct "steps". The first step occurred in 1970 and raised the surgery rate from 66.0 surgeries per thousand in 1969 to 71.8 per thousand in 1970. This step increase lasted through 1972. The second step occurred in 1973 and raised the rate from 73.8 in 1972 to 77.3 in 1973. This step was generally maintained through 1975 although the rate declined somewhat in the last year.

- The major component of the first "step" increase that occurred in 1970 was an increase in the inpatient surgery rate. Almost 75% of the total rate increase appears to have been the result of the increase in the inpatient rate. The surgery rate at the FSASC contributed significantly less to the overall rate, and appears to have been largely composed of surgical procedures which has been shifted from the hospital O.P. setting.

- The major component of the second "step" increase that occured in 1973 was the increase in the surgery rate at the FSASCs and HAASCs. The increase in the inpatient surgical rate was small and contributed little to the overall increase in the total rate between 1972 and 1973. However, it should not be interpreted that the presence of the FSASC and HAASCs were the causal factors in the overall increase in the surgical rate in 1973. The overall trend in the surgical rates for the entire time period is comparable with the increase in the U.S. and the Western census region.

- The inpatient surgical rate in Maricopa County was increasing prior to 1970 but after 1970 exhibited a statistically significant declining trend reflecting the substitution of ambulatory surgical settings for inpatient settings. This decline in the inpatient trend for Maricopa County ran counter to the general increase in the inpatient surgery rate experienced in the West and in the U.S.

- The ambulatory surgery setting rate increased more rapidly after the introduction of the FSASC in 1970 (2.389 average yearly increase in surgeries per thousand population) than in the period 1967-1969 (.350 average yearly increase in surgeries per thousand population) reflecting an increased shift to ambulatory surgical settings after the development of the ambulatory surgical facilities.

Facility Utilization Characteristics

As described in the analysis of surgery volume and rate, the introduction of ambulatory surgical facilities had the effect of redistributing surgery in Maricopa County among alternative settings. In this section, changes in the major facility utilization characteristics over the 1967 to 1975 time period are discussed with respect to the principal impact institutions included in the analysis.

Changes in Length of Stay For Surgery Inpatients. It was expected that as minor, less complex surgery was shifted from the IP surgical settings to the AMB settings that the average length of stay for surgery patients in the inpatient facilities most affected by the FSASCs and HAASCs would increase reflecting the shift in the inpatient case mix to more difficult procedures and/or patients with greater surgical risk. In order to examine the issues, the average length of stay for surgery inpatients at impact hospitals was reviewed from hospital reporting systems for the period 1967 to 1975. Exhibit V-23 shows the average length of stay by year for each of the impact institutions over the timer period. No consistent pattern emerges from the average length of stay statistics although several of the individual hospitals experienced considerable fluctuation in their average length of stay over the eight year period. For the impact institutions the average length of stay ranged from 7.4 days in 1969 to 7.7 days in 1975 for surgery inpatients and exhibited very little variation after 1971.

The change in the average length of stay for all surgery patients at impact institutions taken as a group was was not

Exhibit V-23

Average Length of Stay of Surgery Inpatients at Impact Institutions, 1968-1975

Length of Stay, in Days

Year / Institution	1968	1969	1970	1971	1972	1973	1974	1975
Good Samaritan	8.5	8.5	8.2	8.2	10.8	8.3	9.3	8.2
St. Joseph's	8.3	7.7	8.2	8.2	7.7	8.7	8.2	8.0
St. Luke's	8.7	8.8	10.1	9.3	9.9	9.8	9.1	9.3
Phoenix Baptist	6.6	6.4	6.3	6.1	5.9	6.3	6.1	6.4
Scottsdale Memorial	N.A.	6.1	6.0	6.7	6.4	6.9	6.5	6.5
Memorial	8.5	8.4	9.4	7.9	11.3	8.1	8.9	8.7
All Institutions, All Surgery Patients	N.A.	7.4	7.5	7.7	7.7	7.6	7.7	7.7

Source: Individual hospitals, "Analysis of Hospital Service" Reports.

N.A. = Not Available

statistically significant at the 5% level (r = .762, 5 degrees of freedom, slope = 0.04 days per year). In general, the impact hospitals did not experience any significant increase in the average length of stay that might have been expected as a result of a shift of outpatient eligible surgery to the AMB settings.

Exhibit V-24 presents the average length of stay for selected surgical specialties for the impact hospitals. The specialties with the largest changes in average length of stay over the time period were cardiovascular with a 1.3 day decrease between 1969 and 1975; "other" surgery with a .9 day increase; general surgery with a .7 day decrease; and dental and orthopedic surgery each with a .6 day decrease in the average length of stay.

As with the overall average length of stay for the impact hospitals, the surgical specialty categories exhibited no major shifts in the length of stay that could be attributed to the FSASC and HAASCs.

Changes in the Volume and Rate of Surgery and Non-Surgery Inpatient Days. The volume of surgery inpatient days at the impact institutions increased at a lesser rate than did the volume of non-surgery inpatients days for the time period 1968 to 1975 although the change in the non-surgery inpatient days exhibited more fluctuation. The volume of surgery inpatient days rose by 24.4% between 1968 and 1975 as compared with an increase of 88.1% for non-surgery inpatient days.

Exhibits V-25 and V-26 present the number of surgery and non-surgery inpatient days by institution for the years 1968 to 1975. Good Samaritan, St. Joseph's and Memorial hospitals experienced declines in the volume of surgery inpatient days in 1971—the year after the opening of the FSASC. This decline reflects the shift from inpatient to ambulatory surgical settings that was noted in the analysis of surgical volume after 1970. Neither Good Samaritan nor St. Joseph's experienced declines in the volume of surgery inpatient days in 1970. This corresponds with the previous finding that the immediate, first year impact of the FSASC in 1970 was to shift patients from the hospital outpatient setting. Memorial Hospital did show a decrease in surgery inpatient days in 1970 but this decline was apparently part of a trend for that institution that had been going on since 1968. Neither Scottsdale Memorial nor Phoenix Baptist hospitals

Exhibit V-24

Average Length of Stay of Surgery Inpatients By Specialty at Impact Institutions, 1969-1975

Length of Stay, in Days

Year Specialty	1969	1970	1971	1972	1973	1974	1975
Gynecology	6.1	6.0	6.6	6.6	6.6	6.6	6.0
Otorhinolaryngology	2.7	3.0	2.9	2.3	3.2	3.3	2.4
General Surgery	8.8	8.8	8.5	8.4	8.3	8.0	8.1
Orthopedics	9.8	9.9	10.1	10.3	10.4	10.9	10.4
Ophthamology	4.8	4.8	4.8	4.8	4.5	4.0	5.2
Dental	4.0	2.4	2.2	2.8	3.1	4.4	3.4
Urology	7.1	7.1	7.2	7.7	7.6	6.3	6.7
Plastic	4.9	4.9	5.2	5.8	6.0	5.6	4.9
Cardiovascular	10.5	10.2	9.4	9.9	8.6	9.8	9.2
Thoracic	11.5	10.7	10.2	11.0	14.4	11.6	11.3
Other	7.6	7.9	7.9	7.8	7.1	7.8	8.5
All Surgery	7.4	7.5	7.7	7.7	7.6	7.7	7.7

Source: Individual hospitals, "Analysis of Hospital Service" Reports.

Exhibit V-25

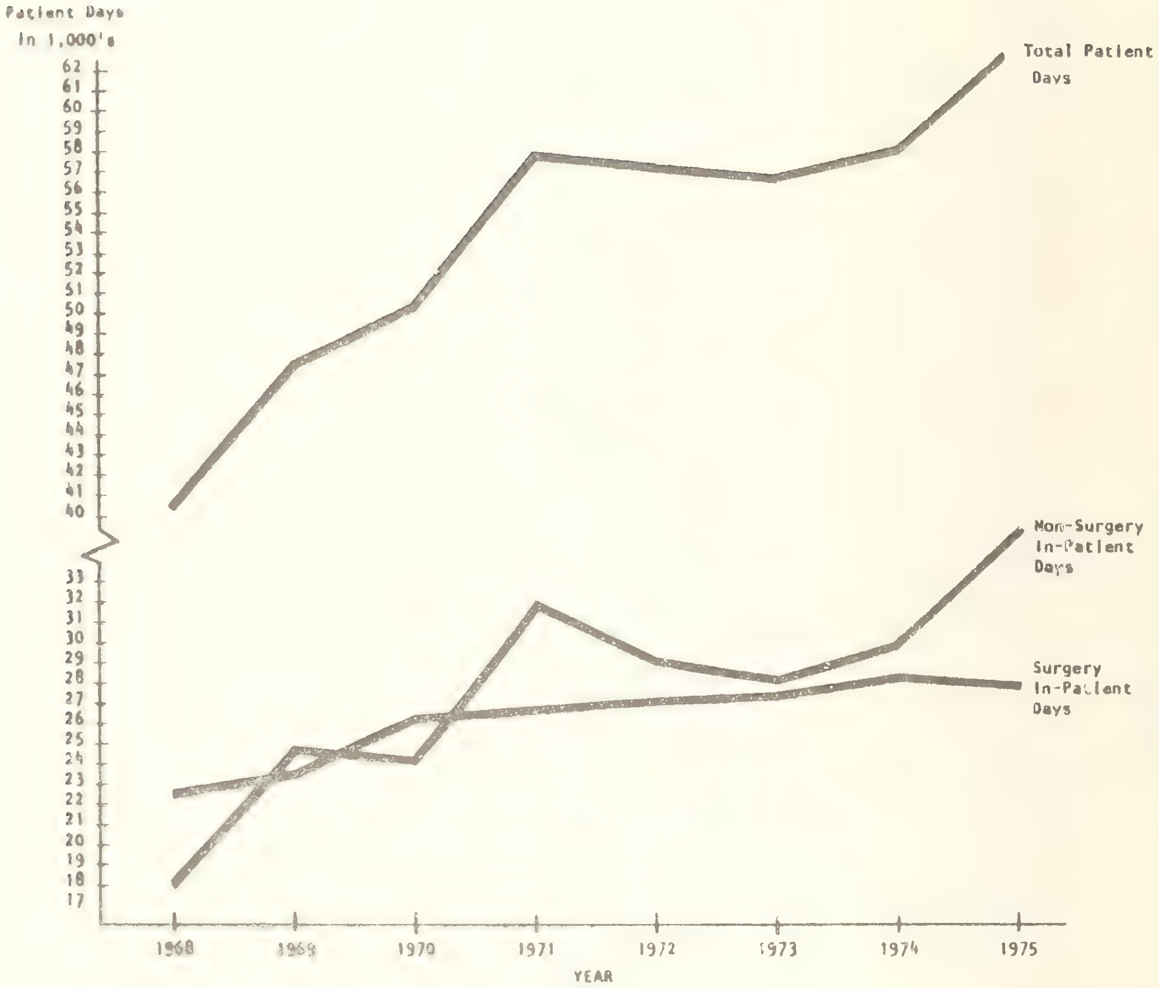
Surgery Inpatient Days and Proportion of Total Inpatient Days at Impact Insitutions, 1968-1975

Year Institutions	1968	1969	1970	1971	1972	1973	1974	1975
Surgery Inpatient Days:								
Good Samaritan	86,275	96,612	97,211	95,261	98,860	97,463	99,017	97,540
St. Joseph's	77,749	71,955	86,605	85,649	87,377	93,647	88,814	81,376
St. Luke's	18,816	20,657	29,763	32,692	34,444	34,192	34,443	36,789
Phoenix Baptist	12,564	13,693	14,727	15,468	15,562	16,479	18,131	20,694
Scottsdale Memorial	17,548	21,691	23,736	26,393	27,326	30,689	33,118	32,689
Memorial	11,020	10,404	7,440	6,160	8,023	9,242	10,421	9,604
Total Surgery Inpatient Days	224,072	235,012	259,482	261,623	271,592	281,712	283,944	278,692
Total Non-Surgery Patient Days	180,476	240,946	239,190	315,599	291,004	277,207	296,527	339,544
Grand Total Inpatient Days	404,548	475,958	498,672	577,222	562,596	558,919	580,471	618,236
% Surgery Inpatient Days of Total Inpatient Days	55.4%	49.4%	52.0%	45.3%	48.3%	50.4%	48.9%	45.1%

Source: Individual Hospitals, "Analysis of Hospital Service".

Exhibit V-26

Total, Surgery and Non-Surgery Patient Days at Impact Institutions, 1968-1975



exhibited decline in surgery inpatient days as a result of the introduction of the FSASC or as a result of the opening of their HAASCs.

The number of inpatient days at impact institutions per 1000 population in Maricopa County for the period 1968 to 1975 is given in Exhibit V-27 and presented graphically in Exhibit V-28. The surgery inpatient day rate moved up sharply to a peak of 26.7 days per 1,000 population in 1970 which corresponds to the first step increase in the inpatient surgery volume rate. After 1970 the total surgery inpatient day rate declined consistently through the end of the evaluation period.

The non-surgery inpatient day rate at the impact institutions has shown considerable fluctuation with a peak of 31.1 patient days per thousand population in 1971, and a substantial decline in 1972 and 1973 before moving upward again in 1974 and 1975. It would appear that the introduction of the FSASCs and the HAASCs and the subsequent shift of surgery of the inpatient setting contributed to the decline in the surgical inpatient day rate at impact institutions after 1970. However, it is not clear that the hospitals experienced an increase in the non-surgical inpatient day rate after 1970 that compensated for the apparent loss of surgery patient days, particularly in the years 1972, 1973, and 1974.

Changes in Bed Occupancy Rates. As described in the section of this chapter on surgical resources, bed expansion programs at several of the impact hospitals were about completed when the Surgicenter was introduced in 1970. The effects of the shift of some surgery patients from inpatient to ambulatory surgical settings and the increased bed capacity at the impact institutions resulted in an overall decline in the bed occupancy rate through 1971 as shown in Exhibits V-29 and V-30. The decline in the bed occupancy rate in the early 1970s was part of a general decline in occupancy rate that had affected Good Samaritan, St. Joseph's, St. Luke's and Memorial hospitals since 1967. Because the decline had been in progress for at least three years prior to the introduction of the FSASC, it would be unwarranted to attribute the continued decline in 1970 to the opening of the FSASC. The decline in occupancy rate in the central Phoenix impact hospitals appears to be more a result of the bed expansion activities at the specific institutions.

Exhibit V-27

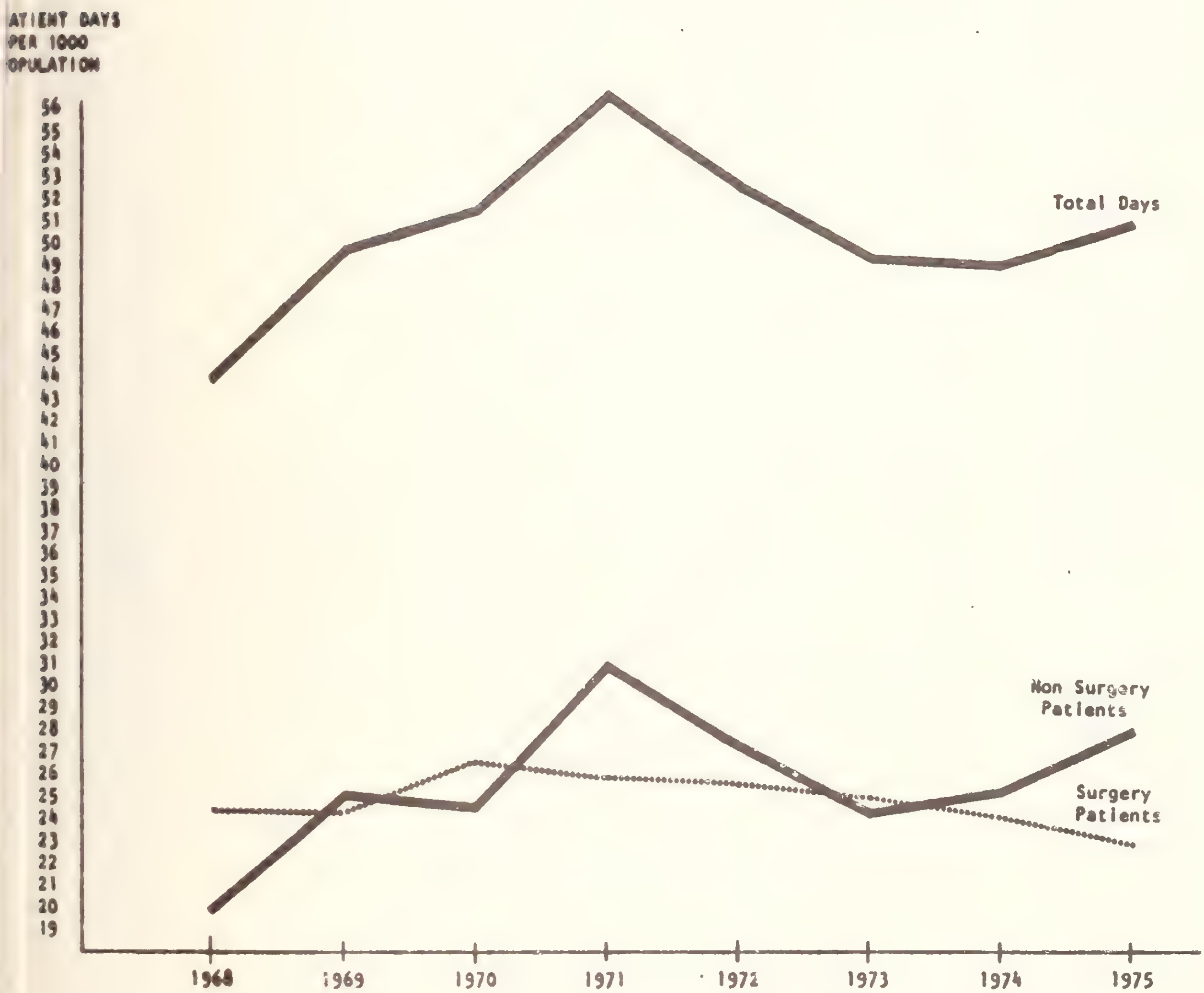
Surgery, Non-Surgery, and Total Inpatient Days at Impact Institutions Per 1000 Population in Maricopa County, 1968-1975

Year / Inpatient Day Category	1968	1969	1970	1971	1972	1973	1974	1975
Surgery Inpatient	24.5	24.8	26.7	25.8	25.5	25.0	24.1	22.9
Non-Surgery Inpatient	19.8	25.5	24.6	31.1	27.4	24.6	25.1	27.9
TOTAL Inpatient	44.3	50.3	51.3	56.9	52.9	49.6	49.2	50.8

Source: Same as Exhibit V-25

Exhibit V-28

Graph of Surgery, Non-Surgery, and Total Inpatient Days at Impact Institutions Per 1000 Population in Maricopa County, 1968-1975



Source: Previous Exhibit

Exhibit V-29

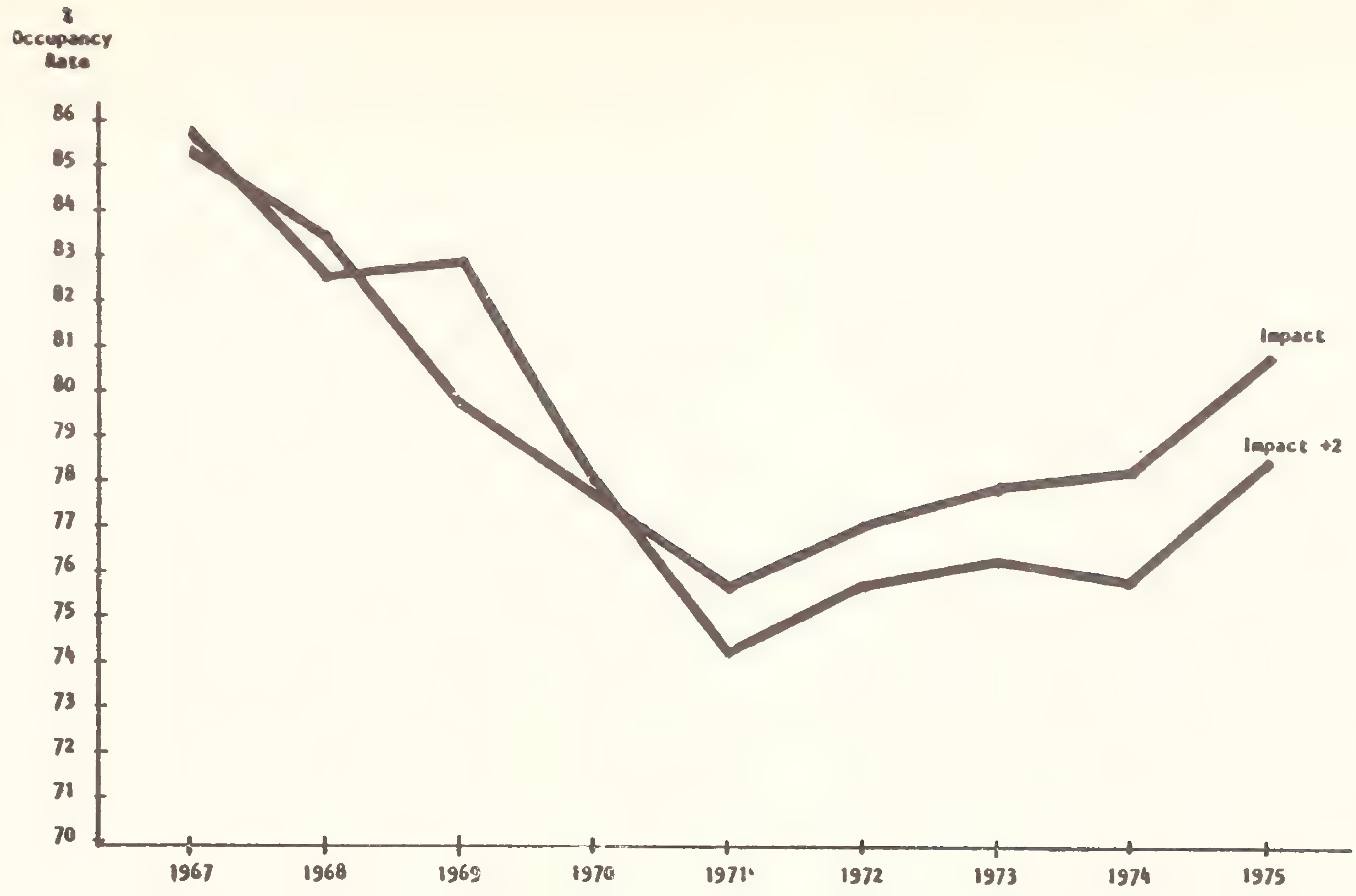
Occupancy Rates at Impact and Two Other Hospitals

Hospital \ Year	1967	1968	1969	1970	1971	1972	1973	1974	1975
Good Samaritan	92.3%	91.4%	84.7%	85.6%	80.0%	81.6%	82.2%	84.7%	82.9%
St. Joseph's	86.2%	87.1%	86.6%	85.1%	84.7%	83.1%	83.8%	83.2%	83.5%
St. Luke's	86.7%	78.1%	55.6%	64.0%	62.1%	66.9%	76.5%	68.4%	81.5%
Scottsdale Memorial	77.9%	80.7%	82.5%	78.6%	74.0%	74.9%	79.6%	80.9%	80.2%
Phoenix Baptist	64.9%	68.9%	71.8%	71.3%	77.3%	81.5%	70.3%	65.0%	73.6%
Memorial	79.9%	72.8%	64.4%	60.1%	52.9%	48.7%	50.0%	54.7%	57.3%
Doctors	84.4%	72.6%	68.1%	67.8%	66.2%	67.3%	67.3%	69.2%	68.4%
John C. Lincoln	73.6%	75.7%	91.7%	85.6%	67.6%	69.5%	81.7%	79.9%	79.8%
Total Impact Hospitals	85.6%	83.5%	79.9%	77.7%	75.6%	77.1%	78.0%	78.3%	80.8%
Impact & Two Other Hospitals	85.8%	82.5%	82.9%	77.8%	74.1%	75.7%	76.3%	75.7%	78.6%

Sources: Data from individual institutions execpt for Doctors and John C. Lincoln Hospitals for which data were obtained from Medicare Cost Reports.

Exhibit V-30

Occupancy Rate at Impact and Impact Plus Two Additional Hospitals, 1967 - 1975



Doctors' Hospital which is located in the central Phoenix area and appears to have been affected by the FSASC in terms of its inpatient surgical volume, also shared a decrease in its occupancy rate that continued through 1974. Doctors' Hospital did not expand its bed capacity during this period and it is likely the major portion of this decline in occupancy was due to the increasing volumes of ambulatory surgery at the FSASC and other institutions.

At Scottsdale Memorial and Phoenix Baptist hospitals where HAASCs were developed in 1971 and 1973 respectively, the occupancy rate showed a decline in the two years after the HAASCs opened, apparently reflecting the shift from the inpatient surgical setting to ambulatory settings; subsequently, the rate began to move upward again.

John C. Lincoln Hopsital also experienced a sharp decline in its occupancy rate in 1970, 1971, and 1972, however the hospital during this period added substantially to its bed capacity. The surgical volume at John C. Lincoln did not decline during this period; thus it appears that the decline in the occupancy rate is as much related to the expansion than to a shift in surgical volume brought on by the ambulatory surgical facilities.

Changes in Operating Room Utilization. The utilization of operating rooms at impact institutions as measured by the number of cases per operating room and the percentage of time the operating room is in use did not exhibit much variation over the period 1968 to 1975. Some institutions, however, experienced more fluctuation than others as shown in Exhibit V-31. Good Samaritan and St. Joseph's hospitals were the most severly impacted with a 26.9% drop in the number of cases handled per operating room at St. Joseph's between 1970 and 1971 and 27.7% decline for Good Samaritan. Memorial Hospital's surgery case load per operating room declined by 6.3% in 1971. St. Luke's declined only 3.0% slightly between 1969 and 1970 but experienced an increase in the caseload per operating room in 1971.

Both Phoenix Baptist and Scottsdale Memorial experienced continually increasing surgery case loads per inpatient operating room until their respective HAASCs were opened. At both facilities a decline in the surgery volume per operating room occurred one year after the HAASCs began accepting cases.

Exhibit V-31

Number of Operating Rooms and Surgery Volume per Operating Room by Institution and Setting for Impact Institutions, 1968-1975

Year / Institution	1968		1969		1970		1971		1972		1973		1974		1975	
	No ORs	Cases/ OR	No. ORs	Cases/ OR	No. ORs	Cases/ OR	No. ORs	Cases/ OR	No. ORs	Cases/ OR	No. ORs	Cases/ OR	No. ORs	Cases/ OR	No. ORs	Cases/ OR
Surgicenter	0	0	0	0	4	602	4	995	4	1,267	6	1,106	6	1,156	6	1,221
Good Samaritan	12	1,113	12	1,234	12	1,224	12	1,130	12	1,116	12	1,146	12	1,201	12	1,185
St. Joseph's	12	997	12	983	12	1,070	14	782	14	871	14	852	14	823	14	721
St. Luke's	4	630	4	659	5	639	5	797	5	806	5	793	5	995	5	828
Scottsdale Memorial	4	820	4	972	4	1,147	4	1,181	7	704	7	737	7	790	7	823
HAASC	0	0	0	0	0	0	3	78	3	429	3	616	3	793	3	958
Phoenix Baptist	3	794	3	796	3	896	3	1,180	3	1,315	3	1,338	3	1,268	3	1,197
HAASC	0	0	0	0	0	0	0	0	0	0	3	366	3	449	3	948
Memorial	6	295	6	294	6	271	6	254	6	352	6	351	6	305	6	294
All Impact Institutions	41	860	41	873	46	951	51	819	54	833	58	864	59	892	59	901
IP and OP	41	860	41	873	42	951	44	875	47	859	47	871	48	878	48	875
HAASC	0	0	0	0	0	0	3	78	3	429	5	516	5	745	5	951
FSASC	0	0	0	0	4	602	4	995	4	1,267	6	1,106	6	1,156	6	1,221
ASF	0	0	0	0	4	602	7	602	7	908	11	838	11	969	11	1,098

For the combined group of impact institutions, the number of cases per operating room rose by 4.8% between 1968 and 1969, and only 3.2% between 1969 and 1975. Neither increase was statistically significant.

In traditional inpatient and outpatient settings, there was a substantial increase between 1969 and 1970 in number of cases per operating room reflecting the sharp increase in IP cases. Between 1971 and 1975 little change was noted (from 859 to 875). Number of cases per operating room at ASF settings did increase substantially between 1970 and 1975. Indeed, this growth was 82.4% between 1970 and 1975. By 1975, operating rooms at the FSASC and the two HAASCs handled more cases per operating room than did traditional settings.

Exhibit V-32 shows that, using mean anesthesia times of patients, capacity utilization of traditional operating rooms did not decline between 1969 and 1975. Based on an 8-hour day, traditional operating rooms were still more fully utilized than were ASF operating rooms. However, it should be noted that the eight hour day estimate may be low for an inpatient institution where surgery may be performed both early in the morning and late in the day. Similarly, the eight hour day may be unreasonably high for the ambulatory setting where the last surgery may be scheduled for as early as 1 or 2 p.m.

Changes in Proportion of Surgery Inpatients Over 65. As shown in Exhibit V-33, the percent of surgery inpatients over 65 years of age rose across all specialties in the period 1968 to 1975. The increase was particularly noted in the specialties including otorhinolaryngology, orthopedics, urology, cardiovascular and thoracic surgery. The percent increase in the proportion of patients over 65 between 1968 and 1975 was 16.9%. It would appear that this indeed is more than accounted for by the increase in the proportion of the over 65 age group in the Maricopa County population which between 1970 and 1975 increased 17.2%. It does not appear that the shift at the impact institutions in large volumes of surgery to ambulatory settings resulted in an over representation of the elderly in the inpatient surgery population after 1970.

Exhibit V-32

Utilization Rates of Operating Rooms by Setting at Impact Institutions, 1969, 1972, 1975

Year / Institution and Setting	1969	1972	1975
All Settings	53.2%	54.4%	50.5%
IP and OP	53.2%	57.3%	55.7%
HAASC	-	12.7%	30.8%
FSASC	-	42.7%	41.0%

Source: Three-year sample of operating room records and log books taken at impact institutions. Total operating room anesthesia time in minutes by setting and institution were divided through by number of operating rooms times number of weekdays per year (250) times number of minutes per eight-hour day. The relatively low capacity utilization estimates result from the fact that necessary "down-time" between operations is not included.

Exhibit V-33

Percent of Surgery Inpatients Over 65 by Specialty at Impact Institutions, 1968-1975

Percent of Inpatient Over 65

Year / Specialty	1968	1969	1970	1971	1972	1973	1974	1975
Gynecology	4.9%	4.6%	4.6%	4.5%	5.1%	5.1%	5.5%	5.5%
Otorhinolaryngology	5.6	5.4	4.7	7.3	6.5	8.1	9.9	8.3
General Surgery	18.1	17.9	17.8	17.2	17.7	17.6	17.6	18.1
Orthopedics	21.0	14.8	14.1	16.3	18.6	17.6	16.7	19.7
Urology	30.7	34.8	33.6	36.2	40.4	37.5	40.2	39.7
Cardiovascular	39.7	30.5	32.6	27.6	27.7	29.0	32.1	34.3
Thoracic	23.6	19.8	24.5	23.4	25.3	33.1	22.6	24.2
All Surgery	16.0	16.1	15.4	16.0	16.5	16.9	16.4	18.7

Source: Individual hospitals, "Analysis of Hospital Service". **Note:** Increases in % of the elderly were significant, with $t_{.10}$=2.056 for all surgery specialties.

Changes in Case Mix. An analysis of changes in the mix of surgical cases between 1969, 1972, and 1975 was performed using a three year sample of operating room records and logbooks from the primary impact institutions and the Phoenix Surgicenter. For the purpose of this analysis, procedures were defined as Inpatient Only (IPO) or Outpatient Eligible (OPE). An OPE procedure is one that is on the master fee schedule of procedures performed in the FSASC setting. Conversely, an IPO procedure is one that is not of the type performed in the FSASC setting and is typically more difficult, may involve greater patient risk and is apparently only performed in an inpatient setting. Each patient case in the sample was assessed to determine if the case included an IPO procedure and/or an OPE procedure. If the case included at least one IPO procedure or had an IPO procedure in combination with an OPE procedure it was designated as an IPO case. If the case included one or more OPE procedures with the IPO procedures, the case was designated as an OPE case.

Exhibit V-34 shows the distribution of surgical cases by type for the years 1969, 1972, and 1975 for the impact institutions including the Surgicenter. As may be seen, the types of cases shifted somewhat towards OPE cases and away from IPO cases for these facilities. The percent of OPE cases in 1969 was 64.9% and moved to 70.2% by 1975. IPO cases dropped from 35.1% in 1969 to 29.8% of all cases in 1975. The shift in the proportion of OPE and IPO cases over the time period is significant with $p \leq .05$.

Although a surgical rate calculation for just the impact institutions is difficult to interpret because of the lack of a specific estimate of the population served by the impact hospitals, the gross rate calculation (number of surgeries at impact institutions divided by Maricopa County population) showed an increase in the OPE rate between 1969 and 1975 and a slight decline in the IPO rate as seen in Exhibit V-35. The slight decline in both rates observed between 1972 and 1975 reflected the previously noted increase in the proportion of total surgeries performed by institutions other than the primary impact facilities.

Exhibit V-34

Distribution of Surgery Cases by Type at Impact Institutions, 1969, 1972, 1975

Year / Type	1969		1972		1975	
	Volume	%	Volume	%	Volume	%
IPO	11,850	35.1%	12,350	28.9%	13,963	29.8%
OPE	22,088	64.9%	30,425	71.1%	32,875	70.2%
Total	33,938	100.0%	42,775	100.0%	46,838	100.0%

Source: Three-year sample of operating room records and log books.

Note: The shift to OPE is significant at 5% level with $\chi^2 = 45$ with 2 degrees of freedom

Exhibit V-35

Surgery Rate per 1,000 Population, by Type, at Primary Impact Institutions, 1969, 1972, 1975

Surgery Rate/1,000 Population

Year / Type	1969	1972	1975	
OPE	23.35	28.55	27.00	
IPO	12.53	11.59	11.47	

Source: Three-year sample of operating room logs and records.

Based on the increase in the proportion of OPE cases over the time period and the increase in the OPE rate, it would appear that the Surgicenter and the two HAASCs had a significant influence on the case mix of procedures performed at the impact institutions. This may partially be accounted for by relatively new, high-volume procedures performed in these ambulatory settings such as laparoscopy with bilateral tubal coagulation. Such procedures which are OPE procedures that are substitutes for IPO procedures would tend to increase the proportion of OPE surgical cases.

In order to study the impact of the introduction of the ambulatory surgical settings on the case mix in the inpatient institutions, the distribution of IPO and OPE cases performed in just the inpatient settings at the impact hospitals was examined. Exhibit V-36 shows that the proportion of OPE cases of all cases in inpatient settings declined from 61.8% in 1969 to 58.0% in 1975. It would appear that the inpatient setting was losing OPE procedures to ambulatory settings with, consequently, an increase in the complexity of the inpatient case mix.

Although surgery rates calculated for the impact hospitals declined for both the IPO and OPE case types as shown in Exhibit V-37, the OPE rate declined substantially more (20.3 in 1969 to 15.8 in 1975) than did the IPO rate (12.6 in 1969 to 11.5 in 1975). Again the decline in the OPE rate in the inpatient setting may be attributable to the substitution of ambulatory settings for inpatient settings for these types of surgical procedures. Surgicenter and the two HAASCs drew not only on hospital outpatient cases but also on OPE cases done in inpatient settings.

Exhibit V-38 presents the distribution of surgery cases by setting and type at impact institutions for 1969, 1972, and 1975. The percent of IPO cases performed in inpatient settings declined over the time served as did the percent of OPE cases in inpatient settings. The proportion of all cases performed in the hospital outpatient setting went from 7.1% in 1969 to 9.2% in 1972 but dropped to 4.2% by 1975. By 1975 , the proportion of all cases performed in the HAASC and FSASC setting was 24.8%.

Exhibit V-36

Distribution of Cases by Type at Inpatient Settings at Impact Institutions, 1969, 1972, 1975

Year / Type	1969		1972		1975	
	Volume	%	Volume	%	Volume	%
OPE	11,888	38.2%	12,350	38.5%	13,963	42.0%
IPE	19,220	61.8%	19,663	61.5%	19,288	58.0%
Total	31,108	100.0%	32,013	100.0%	33,251	100.0%

Source: Three-year sample of operating room records and log books. Observations of annual samples of 20 days were multiplied by 12.5 to obtain annual estimates.

Note: The reduced proporation of OPE cases is significant, at 5% level, with $\chi^2 = 7.6$ with 2 degrees of freedom.

Exhibit V-37

Rates of Surgery Volume per 1,000 Population in Inpatient Settings at Impact Institutions, 1969, 1972, 1975

Rate of Surgery Volume/1,000 Populations

Year / Type	1969	1972	1975
IPO	12.6	11.6	11.5
OPE	20.3	18.4	15.8

Source: Three-year sample of operating room records and log books. Observations of annual samples of 20 days were multiplied by 12.5 to obtain annual estimates.

Exhibit V-38

Number and Proportion of Surgery Cases by Setting and Type at Impact Institutions, 1969, 1972, 1975

Year / Setting and Type	1969		1972		1975	
	Vol	%	Vol	%	Vol	%
IP-IPO	11,888	35.2%	12,350	28.9%	13,963	29.8%
IP-OPE	19,513	57.7	19,663	46.0	19,288	41.2
OP	2,411	7.1	3,938	9.2	1,988	4.2
HAASC	0	0.0	1,663	3.9	4,813	10.3
FSASC	0	0.0	5,163	12.1	6,788	14.5
Total	33,812	100.0%	42,777	100.0%	46,840	100.0%

Source: Three-year sample of operating room records and log books.

The change in the percent of OPE cases in the six impact hospitals is presented in detail in Exhibit V-39. The sharpest decline in IP-OPE cases occurred, as expected, at Good Samaritan and the two institutions with HAASC's. St. Joseph's experienced no decline at all, probably because of large increases in OPE neurological cases that were not typically done at Surgicenter.[3] Memorial's decline in 1972 was due to a short-term increase in outpatient orthopedic cases.[4] It should be noted that the two impact institutions with the smallest proportion of OPE cases done in the IP setting in 1975 were Scottsdale Memorial and Phoenix Baptist with 40.1% and 33.4% respectively. These are the two institutions with hospital affiliated ambulatory surgical centers operated by the institutions.

Another measure of the complexity of the surgical case mix experienced by institutions is the distribution of combinations in which IPO and OPE procedures are performed. That is, Multi-IPO, Single IPO, Mixed IPO & OPE, Multi-OPE, and Single OPE. Although it is a relatively crude measure, it does provide some insight into the changes that occurred in the mix of cases. Exhibit V-40 shows what happened to the distribution of cases by complexity over time. It is interesting to note that between 1969 and 1972, the proportion of cases containing only one OPE procedure (Single OPE) rose and the proportion of cases containing two or three OPE procedures (Multi-OPE) fell. By 1975, however, this pattern had reversed and the share of Multi-OPE cases increased and the share of Single OPE cases decreased somewhat. These changes may reflect caution in the choice of procedures for the ambulatory surgical center settings during the initial start up period with increased confidence by physicians and management in the later time period enchanced by more Multi-OPE cases. Exhibit V-41 confirms these inferences of the complexity of cases at ASF settings.

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[3] After 1970, the mix of OPE cases at St. Joseph's became weighted toward neurological surgery done in the traditional IP setting.

[4] One physician reportedly began doing his cast operations in operating rather than cast rooms.

Exhibit V-39

Percentage of IP-OPE Cases for Six Primary Impact Institutions, 1969, 1972, 1975

Percent of All Surgeries Constituted by IP-OPE Surgeries

Year / Impact Hospital	1969	1972	1975
Good Samaritan	58.8%	49.6%	50.9%
St. Joseph's	55.7%	65.4%	59.7%
St. Luke's	50.5%	44.2%	45.4%
Scottsdale Memorial	59.8%	41.6%	40.1%
Phoenix Baptist	62.2%	56.0%	33.4%
Memorial	52.4%	33.3%	55.6%
Total, 6 Impact Institutions-Percent IP-OPE Cases of all Surgeries	57.7%	46.0%	41.2%

Source: Three-year sample of operating room records and log books.

Exhibit V-40

Distribution of Surgery Cases In Seven Primary Impact Institutions by Complexity, 1969, 1972, 1975

Year Complexity	1969	1972	1975
Single IPO	20.1%	20.3%	16.1%
Multi IPO	10.7%	6.8%	10.0%
Mixed OPE & IPO	4.4%	3.1%	3.9%
Single OPE	46.1%	55.9%	50.6%
Multi OPE	18.7%	13.9%	19.4%
Total	100.0%	100.0%	100.0%

Source: Three-year sample of operating room records and log books.

Exhibit V-41

Complexity of Outpatient Eligible Surgery Cases at Ambulatory Surgical Centers: 1972, 1975

Year / Case Complexity	1972		1975	
	Volume	%	Volume	%
Single OPE	5,400	79.6%	8,475	73.8%
Multi OPE	1,388	20.4%	3,000	26.2%
Total	6,788	100.0%	11,475	100.0%

Source: Two-year sample of operating room records and log books (No ASFs were operating in 1969).

Note: Shift between single and multi OPE procedures is significant at 5% level, $\chi^2 = 6.03$.

Summary of Findings. With respect to the impact of the FSASC and the HAASCs on the utilization characteristics of the impact institutions, relatively few changes were detected, apart from the changes in surgery volume by setting described in previous sections of this chapter. The principal findings were as follows:

- The introduction of the FSASC and the HAASCs at the impact institutions and the subsequent shifts in surgeries among settings that occurred did not result in any significant increase in the average length of stay for surgery inpatients during the period 1968 to 1975.
- The introduction of the FSASC and the HAASCs apparently contributed to a decline in the number of surgery inpatient days per 1000 population at impact institutions from 26.7 in 1970 to 22.9 in 1975. The total volume of inpatient surgery days declined at three of the six impact hospitals between 1969 and 1975 reflecting the shift in surgery volumes from inpatient to ambulatory settings.
- The number and rate of non-surgery inpatient days fluctuated widely between 1968 and 1975 apparently unrelated to the shifts in the volumes or rates of inpatient or ambulatory surgeries.
- Bed occupancy rates at the impact institutions declined sharply between 1967 and 1971 from 85.5% to 75.6%. This decline was apparently related to the general expansion in bed capacity during that period rather than the impact of the FSASC. The introduction of the HAASCs after 1971 apparently resulted in a temporary decline in the occupancy rates at these institutions in the two years after the HAASCs opened.
- The introduction of the FSASC and the HAASCs was followed by a slight decline in the number of surgical cases handled per operating room per year at the hospitals most impacted by the ambulatory surgical centers.

- The proportion of the surgery in patients over 65 at the impact hospitals did not change over the time period beyond the change that would be expected from the change in the age composition of the Maricopa County population.
- The FSASC and the HAASCs contributed to the decline in the proportion outpatient eligible cases done in inpatient setting from 62.1% in 1969 to 58.0% in 1975.
- The institutions that experienced the most significant decline in the proportion of outpatient eligible cases performed in the inpatient setting were the two institutions that opened HAASCs.

Surgical Resources

In this section, the changes in the volume and characteristics of the surgical resources that occurred in Maricopa County over the time period included in the evaluation are discussed. Surgical resources are divided into two principal groups: facilities, which includes institutions, operating rooms, and hosptials beds; and manpower, which includes physicians and subgroupings of surgical specialties.

Facilities. The period 1970 through 1973 was marked by a significant expansion of health facilities in Maricopa County. It is apparent that the development of the FSASCs and the HAASCs were only one aspect of the overall development of health facilities that saw major additions to the bed capacity and operating room capacity throughout the metropolitan area.

Development of New Facilities - As a result of the introduction of the Surgicenter in central Phoenix in 1970 and the subsequent shifts in surgery volumes from hospital inpatient and outpatient settings to the ambulatory surgical center setting, several ambulatory surgical facilities modelled after the Surgicenter were planned and developed after 1970.

- In September, 1971, Scottsdale Memorial Hospital opened the first HAASC in Maricopa County across the street from its main facility in downtown Scottsdale. The facility has three operating rooms.
- Phoenix Baptist Hospital opened the second hospital affiliated surgical center with a potential of four operating rooms at its west Phoenix location in April, 1973.
- In January, 1976 Phoenix General Hospital, an osteopathic facility in the west Phoenix area opened a one operating room HAASC in an attempt to reverse the declining trend of its outpatient surgery volume experienced since 1973.
- John C. Lincoln Hospital in the north Phoenix area was approved by the Central Arizona Health Systems Agency for an HAASC to open with two operating rooms adjacent to its main facility in July, 1977.

However, the ambulatory surgical services in central Phoenix continue to be dominated by the FSASCs. Hospitals in the downtown area have not developed HAASCs although institutions have increased the activity of their outpatient surgery programs with varying success. In March, 1977, a proposal by St. Luke's Hospital to build an HAASC was rejected by the Central Arizona Health Systems Agency.

Since the 1970 opening of the Surgicenter, four additional FSASCs have opened in the Phoenix metropolitan area. All are surgeon-owned and controlled as contrasted with the Surgicenter which is owned by anesthesiologists.

- Phoenix Surgical Facilities opened in December, 1972 in the immediate vicinity of the Surgicenter and Good Samaritan Hospital with two operating rooms.
- Arizona Medical Plaza, in the west Phoenix area opened in October, 1973 with two operating rooms.
- In December of 1974, Health Maintenance Associates opened with a potential of four operating rooms in Mesa, Arizona in the southeast metropolitan area.

- 2,000 Place Surgery in Tempe, Arizona opened in mid-1975, with two operating rooms.

An application by the Surgicenter to open a second facility in the vicinity of St. Joseph's Hospital was rejected by the health planning agency in 1972. However, in 1973 it was permitted to expand its original facility to include six operating rooms.

Hospital Beds - The period 1970 through 1972 saw major hospital construction programs underway in greater Phoenix. Most of these efforts had been in the planning and design stage in the late 1960s but by 1972 most construction activity was complete with the result that the bed capacity in greater Phoenix expanded 15.9% from 1970 to 1972. During this period, ten hospitals in greater Phoenix added to their existing complement of beds, and Boswell Memorial, NHE Community-Scottsdale, and two other institutions opened their doors for the first time. Exhibit V-42 provides an inventory of hospital bed capacity in hospitals in greater Phoenix. Exhibit V-43 plots the bed capacity over the period 1966 to 1975.

The development and opening of Surgicenter in 1970 may be viewed as part of a larger movement toward the expansion of health services facilities in Phoenix that occurred during this time frame. The general expansion was, in part, provided impetus by the substantial growth in the Maricopa County population previously discussed. Exhibit V-44 shows that the proportion of beds at the impact institutions has remained relatively constant with about a five percent increase between 1966 and 1970, moving from 45.1% to 50.2%. This reflects the expansions at Good Samaritan, St. Joseph's, St. Luke's, and Scottsdale Memorial hospitals which opened additional beds in 1970. By 1972, the building programs at other facilities had reached culmination and the proportion of beds at impact institutions returned to approximately 1969 levels.

The bed rate, defined as the number of beds per thousand population in Maricopa County, increased as did the bed capacity over the period 1970 through 1972. As building programs subsided and population growth continued, the bed rate for greater Phoenix dropped after 1970 to return to its 1969 levels. Approximately the same pattern occurred

Exhibit V-42

Hospital Bed Capacity in Greater Phoenix by Institution, 1966-1975

Institution / Year	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Good Samaritan	476	476	517	644	691	715	691	699	699	691
St. Joseph's	453	411	450	445	515	530	564	560	560	563
St. Luke's	114	128	118	118	290	286	304	290	290	316
Doctors	216	301	301	305	300	300	300	300	300	300
Scottsdale Memorial	109	154	136	136	208	233	222	220	236	236
Phoenix Baptist	107	124	118	119	119	119	119	170	170	170
Memorial	147	147	144	159	185	159	159	162	131	139
Maricopa County General	460	349	385	398	467	493	493	495	495	495
John C. Lincoln	114	114	131	120	166	202	202	181	184	184
Phoenix General	112	196	198	196	200	198	240	240	234	234
Boswell Memorial	0	0	0	0	0	0	206	206	141	151
Desert Samaritan	139	138	139	139	139	149	204	204	174	175
Arizona Children's	70	70	84	87	84	84	162	162	130	130
Maryvale Samaritan	140	140	140	146	147	147	147	147	143	143
Glendale Samaritan	62	62	62	62	62	62	62	62	62	62
MHE Community	50	50	50	50	50	50	50	50	50	50
Mesa General	70	68	64	68	105	105	105	105	105	105
Mesa Lutheran	170	167	169	169	169	169	250	250	250	250
MHE Community Scottsdale	0	0	0	0	0	0	34	34	34	34
Chandler Community	42	42	42	42	42	42	42	42	40	40
Tempe Community	68	68	62	63	63	62	81	81	81	81
Total Bed Capacity	3,119	3,205	3,310	3,458	4,002	4,105	4,637	4,660	4,509	4,549

Note: Scottsdale Memorial, Desert Samaritan, and Glendale Samaritan were formerly known as Baptist Hospital of Scottsdale, Northwest, and Southside Hospitals, respectively.

Sources: Data from impact hospitals came directly from the institutions. Data on the other hospitals came from either the American Hospital Association, *Guide Issue*, 1966-1975, or from the Hill-Burton Program administered by the Arizona Department of Health Services. In some years, these sources conflicted; the *Guide Issue* data was the preferred source, since the Hill-Burton data were based on construct plans. The VA, IHS, and St. Luke's Air Force Base Hospitals were omitted.

Exhibit V-43

Beds at Short-Term, Acute Care Hospitals Greater Phoenix, 1966-1975

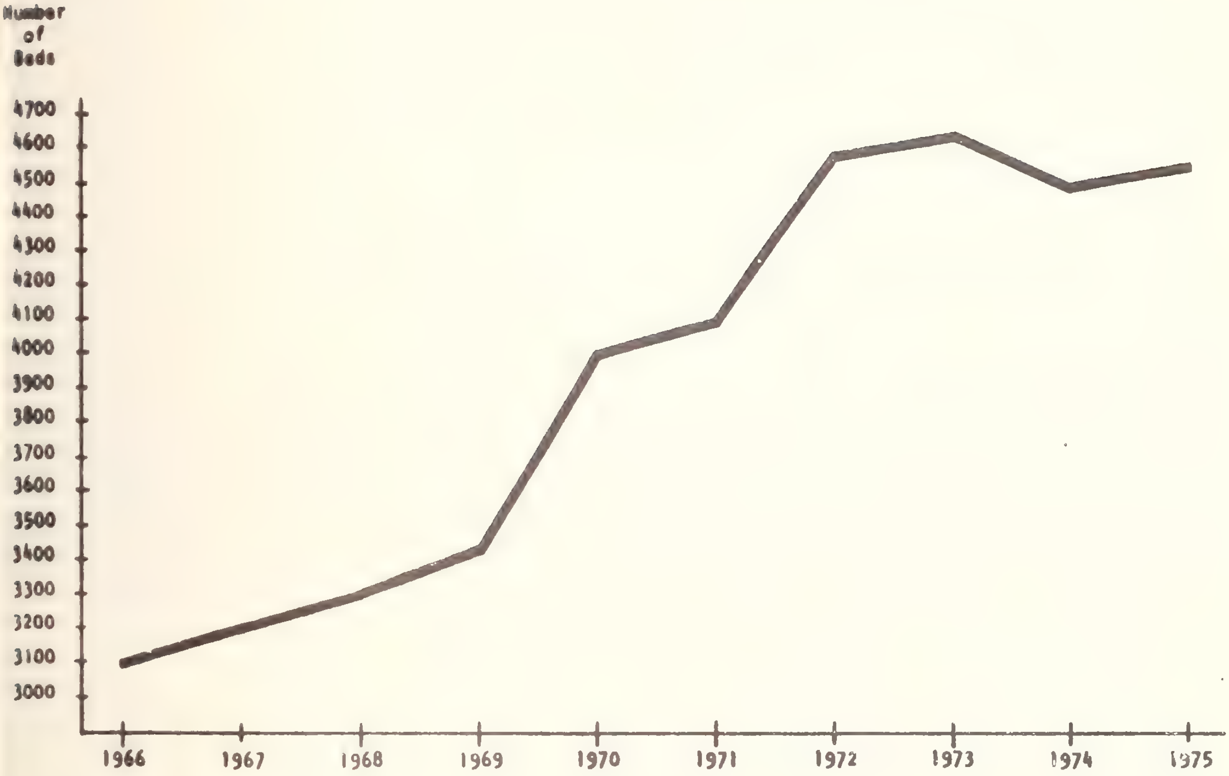


Exhibit V-44

Proportions of Maricopa County Hospital Bed Capacity at Impact and Selected Non-Impact Institutions, 1966-1975

Proportion of Total County Capacity

Year Hospital Category	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Impact Hospitals	45.1%	44.9%	44.7%	46.8%	50.2%	49.9%	44.4%	45.1%	46.2%	46.5%
Impact and Selected Non-Impact Hospitals	71.5%	75.9%	75.8%	76.4%	76.8%	76.5%	71.2%	71.2%	72.3%	72.3%

Source: Exhibit V-42

for the impact institutions as shown in Exhibits V-45 and V-46 except that the bed rate peaked in 1970 rather than in 1972 as with all institutions reflecting the earlier building programs at the impact hospitals.

It is apparent that the development of the FSASC did not impact the bed construction and expansion plans at the impact facilities because those projects were well underway by the time the Surgicenter or the HAASC's appeared on the scene. The expansion that took place after 1971 was concentrated in hospitals that are not as directly in competition with the FSASC as are the impact hospitals. Hospitals that expanded by 1972 included Phoenix General and NHE Community-Scottsdale, which are osteopathic facilities, Mesa General and Desert Samaritan located in Mesa on the edge of Phoenix, Boswell Memorial located in Sun City seventeen miles to the northwest of central Phoenix, and Arizona Childrens located in Tempe.

The two major increases in the bed capacity rate for Maricopa County occurred in 1970 and 1972 after which the bed rate returned to approximately 1969 levels. It will be recalled that the two step increases in the Maricopa County surgery rate occurred at about the same times, in 1970 and 1973.

Operating Rooms - Number of operating rooms constitutes another measure of surgery capacity and resources. Changes in the number of operating rooms may influence volume and rate of surgery. Exhibits V-47 and V-48 show the distribution of operating rooms at all health care institutions in greater Phoenix. Between 1968 and 1975, operating room capacity grew faster for all Phoenix institutions (49.4%) generally than for impact institutions (43.9%). The share of operating room capacity at impact institutions attained a peak of 55.8% in 1970, then declined to 47.6% in 1975. This growth pattern parallels the expansion of bed capacity previously discussed. In this period, number of operating rooms at impact institutions grew from 41 in 1969 to 46 in 1970 and to 52 in 1971. The expansion in 1970 occurred at Surgicenter and was accompanied by a sharp decline in OP surgeries at two impact institutions and an increase in IP surgeries, in turn associated with an increase in bed capacity. The expansion of operating room capacity in 1971 occurred at the Scottsdale Memorial HAASC and appeared to be associated with a decline in OP surgery there. IP sur-

Exhibit V-45

Number of Hospital Beds per 1,000 Population at all Maricopa County Hospitals, at Impact Hospitals, and at Impact and Selected Non-Impact Hospitals, 1966-1975

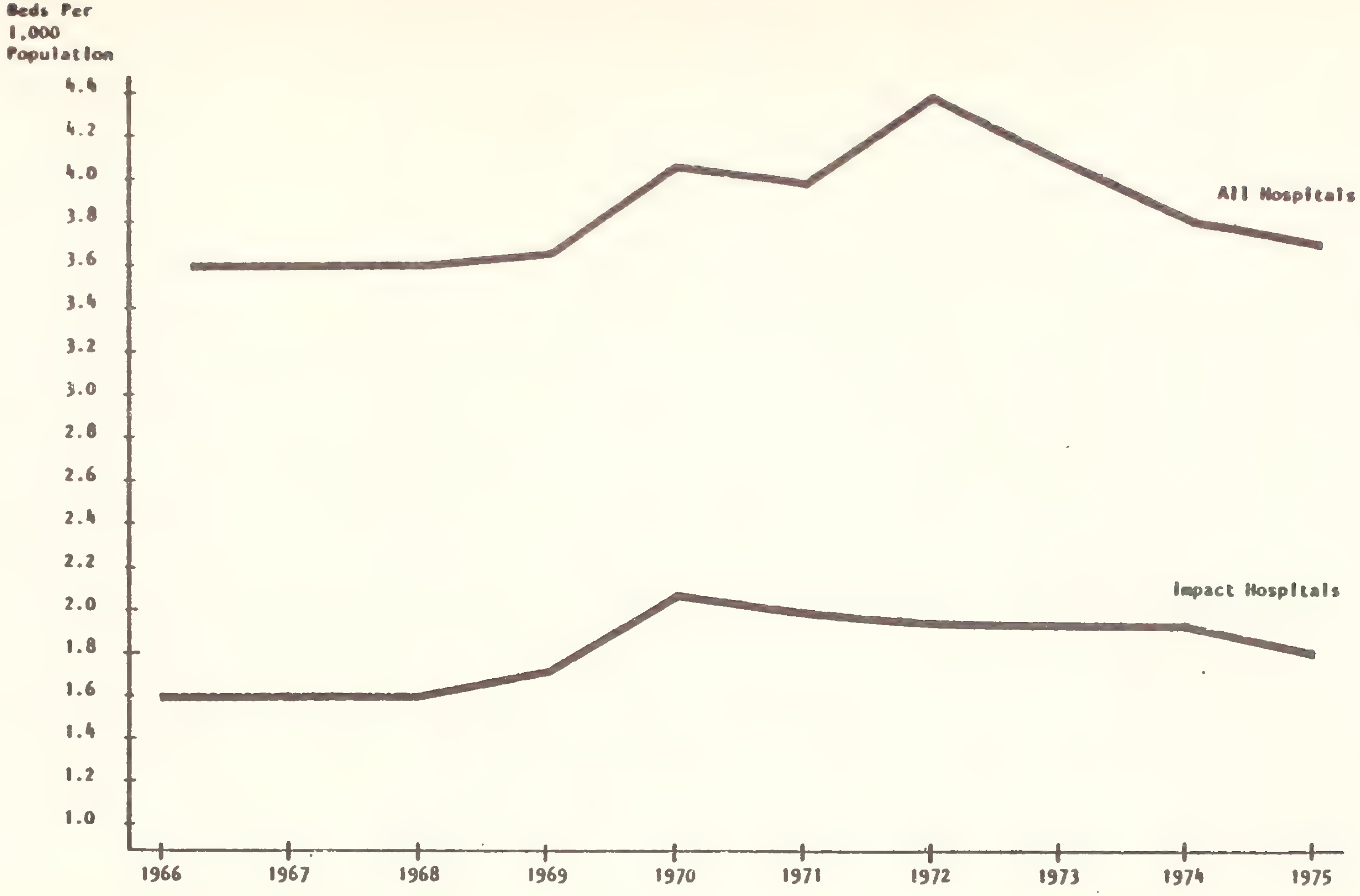
Number of Beds/1,000 Population

Year Bed Capacity Rate	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
All Hospitals	3.6	3.6	3.6	3.7	4.1	4.0	4.4	4.1	3.8	3.7
Impact Hospitals	1.6	1.6	1.6	1.7	2.1	2.0	1.9	1.9	1.8	1.7
Impact and Selected Non-Impact Hospitals	2.6	2.7	2.7	2.8	3.2	3.1	3.1	3.0	2.8	2.7

Source: Exhibit V-42

Exhibit V-46

Bed Rate (Per 1,000) for All Hospitals and Impact Hospitals, 1966-1975



Source: Previous exhibit

Exhibit V-47

Number of Surgical Operating Rooms at 22 Facilities in Maricopa County, 1968-1975

Facility \ Year	1968	1969	1970	1971	1972	1973	1974	1975
Surgicenter	0	0	4	4	4	6	6	6
Good Samaritan	12	12	12	12	12	12	12	12
St. Joseph's	12	12	12	14	14	14	14	14
St. Luke's	4	4	5	5	5	5	5	5
Doctor's	6	6	6	6	6	10	10	10
Scottsdale Memorial	4	4	4	7	10	10	10	10
Phoenix Baptist	3	3	3	3	3	6	6	6
Memorial	6	6	6	6	6	6	6	6
Maricopa County	4	4	4	4	7	7	7	7
John C. Lincoln	4	4	4	5	5	5	5	9
Phoenix General	5	5	5	5	6	6	6	6
Boswell Memorial	0	0	0	0	5	5	5	5
Desert Samaritan	4	4	4	4	8	8	8	10
Arizona Children's	2	2	2	2	2	2	2	2
Maryvale Samaritan	4	4	4	4	4	4	4	4
Glendale Samaritan	3	3	3	3	3	3	3	3
Mesa General	2	2	2	2	2	2	2	2
Mesa Lutheran	5	5	5	5	7	7	7	7
Chandler Community	1	1	1	1	1	1	1	1
Tempe Community	2	2	2	2	2	2	2	2
Arizona Medical Plaza	0	0	0	0	0	0	1	1
Phoenix Surgical Facilities	0	0	0	0	0	2	2	2
TOTAL	83	83	88	94	112	123	124	124

Sources: Data on impact institutions were taken directly from the institutions. Data for Arizona Children's, Maricopa County General, Chandler and Tempe were also obtained directly from the institutions. Data from the other hospitals were obtained from the Hill-Burton Program in the State Department of Health Services. These data are based on construction plans, and in some cases overestimate actual operating room capacity. In addition, the Department of Helath Services may not always have been notified of changes in capacity in a timely fashion. Hence, data on capacity at non-impact institutions should be viewed with caution. Operating rooms are included in the tallies if they are in use or if they were used as storage areas with most fixed equipment in place. If operating rooms were not used as operating rooms and fixed equipment had been removed, then they were not included in the tallies. "Clinic," (at St. Joseph's), cost, X-ray, and emergency rooms were not included in the counts.

Exhibit V-48

Proportion of Total Maricopa County Operating Rooms Located in Impact and Selected Non-Impact Institutions, 1968-1975

Year Institutional Category	1968	1969	1970	1971	1972	1973	1974	1975
Impact Hospitals	49.4%	49.4%	52.3%	55.8%	48.2%	48.8%	47.6%	47.6%
Impact Plus Selected Non-Impact Hospitals	81.9%	81.9%	83.0%	83.9%	74.0%	76.4%	76.6%	76.6%

Source: Previous Exhibits

gery rates also began to decline at about that time. It would appear that the initial effect of Surgicenter consisted of drawing surgeries primarily out of OP setting; thereafter, Surgicenter—with the eventual help of the HAASC's—began to draw on outpatient eligible surgeries that would otherwise have been done in IP settings.

Exhibit V-49 shows the changes in the operating room rate per 100,000 population. The operating room capacity rate at impact institutions follows the total surgery rate fairly closely in most years except 1971, when Scottsdale Memorial opened its HAASC late in the year. Between 1968 and 1975, operating room capacity rates increased substantially, at impact, selected non-impact, and other hospitals in greater Phoenix. The rate grew less rapidly at impact institutions than at other institutions. During the seventies, major increases in operating rooms occurred at John C. Lincoln, Boswell, and Mesa Lutheran Hospitals. Operating rooms were expanding at hospitals on the outer edges of greater Phoenix. The expansion in bed and operating room capacity at these hospitals in 1972 and 1973 followed a similar expansion at impact institutions in 1969 and 1970. This phenomenon may help explain the fact that surgery rates at impact institutions rose less from 1972 on than they would have otherwise. The change in the operating room capacity rate at impact institutions between 1969 and 1975 is roughly equal to the change in the total annual surgery rate (12.1%). The operating room capacity rates of traditional declined significantly, while the rate for ASF's increased significantly. In effect, among impact institutions, ASF operating rooms were substituted for traditional operating rooms. The operating room rate for all impact institutions did not increase significantly between 1971 and 1975; the major increase occurred between 1968 and 1971 which corresponded with the completion of the building programs at the impact hospitals. Exhibit V-50 reports the results of the test of significance on the slopes of the operating room rates for selected sets of institutions and time periods. Operating rooms per hundred thousand population in Maricopa County increased significantly for the set of all institutions and impact institutions over the period 1968 and 1975. However, the rate in traditional inpatient and outpatient settings at impact hospitals declined significantly as ASF operating rooms apparently replaced the need for the continued expansion of additional traditional operating rooms.

Exhibit V-49

Operating Room Rate per 100,000 Population in Maricopa County, 1968-1975

Year / Category of Institution	1968	1969	1970	1971	1972	1973	1974	1975
All Institutions	9.1	8.8	9.1	9.2	10.5	10.9	10.5	10.5
Impact	4.5	4.3	4.7	5.0	5.1	5.2	5.0	4.8
Impact + Selected Non-Impact	7.4	7.2	7.5	7.7	7.8	8.3	8.0	7.8
Impact-Traditional ORs	4.5	4.3	4.3	4.3	4.4	4.2	4.1	3.9
ASF	0.0	0.0	.4	.7	.7	1.0	.9	.9

Source: Exhibit V-47 population data presented earlier.

Exhibit V-50

Test of Significance in Changes in Operating Room Surgery Rate per 100,000, 1968-1975

Operating Rooms	Period	N	R^2	Slope	Intercept	5% Significance
OR's - All	1968-1975	8	.787	.277	8.649	Yes
OR's - Impact	1968-1975	8	.457	.086	4.439	Yes
OR's - Impact Plus Select Non-Impact	1968-1975	8	.605	.111	7.214	Yes
Traditional OR's - Impact	1968-1975	8	.723	-.064	4.539	Yes
ORs - ASF	1970-1975	6	.709	.097	.427	Yes

Source: Previous Exhibits

Manpower. Exhibit V-51 presents the numbers of physicians and surgeons by specialty in greater Phoenix between 1967 and 1975. Surgeons as a proportion of total physicians increased from 32.4% in 1966 to 34.5% in 1975. Exhibits V-52 and V-53 show that between 1967 and 1975, increases in the rate per 10,000 population of surgeons generally, and otorhinolaryngologists, in particular, were statistically significant. Increases in the rate of physicians, and of gynecologists and general surgeons were not significant. These results are difficult to interpret. Many physicians who did not list any surgery specialties nonetheless performed surgeries. Many surgeons who listed one primary surgery specialty in the telephone directories on which the inventory was based may perform surgeries in other specialties. In light of these considerations, changes in specialties should be viewed with caution. The physician rate from 1967 to 1975 varied considerably, but the overall increase from 1966 to 1971 was significant. The physician rate reached a peak in 1970, and declined afterwards until moving upward in 1975 to 11.1 physicians per 10,000 population. This increase in the physician rate in 1970 occurred at the time that increases in total and IP surgery rates were occurring.

Rates of physicians, surgery volumes, bed capacity, and, to a lesser extent operating room capacity all moved in similar patterns. Although it is difficult to determine whether changes in surgery rates are "demand" or "supply" induced, there is little doubt that changes in surgery resources are closely associated with changes in surgery volumes. The rate of surgeons did increase significantly over the period 1967 to 1975. Exhibits V-54 and V-55 show graphically the changes in the numbers and rates of physicians and surgeons in greater Phoenix.

Exhibit V-51

Physicians in Surgical and Other Specialties
Active in Greater Phoenix, 1967-1975

Year / Specialty	1967		1968		1969		1970		1971		1972		1973		1974		1975	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Gynecological	75	27.2	79	28.0	75	24.2	88	26.7	88	24.0	96	24.4	93	22.6	97	22.9	104	22.3
Otorhinolaryngological and Ophthalmologies	42	15.2	42	14.9	45	14.8	46	13.9	51	13.9	66	16.8	70	17.0	80	18.9	86	18.5
General Surgery	99	35.9	99	35.1	121	39.0	112	33.9	129	35.2	134	34.1	137	33.3	138	32.6	132	28.3
Cardiovascular	10	3.6	11	3.9	10	3.2	16	4.8	16	4.4	14	3.6	21	5.1	21	5.0	21	4.5
Neurological	8	2.9	9	3.2	10	3.2	14	4.2	14	3.8	14	3.6	15	3.6	15	3.5	17	3.6
Gastrointestinal	0	0	0	0	0	0	1	.3	2	.6	3	.8	5	1.2	3	.7	3	.6
Pediatric	2	.7	2	.7	3	1.0	3	.9	4	1.1	4	1.0	4	1.0	4	.9	6	1.2
Orthopedic	32	11.6	29	10.3	37	11.9	37	11.2	45	12.3	42	10.7	45	11.0	48	11.3	68	14.6
Urological	1	.4	2	.7	2	.6	3	.9	3	.8	3	.8	4	1.0	3	.7	3	.6
Plastic	7	2.5	9	3.2	7	2.3	10	3.0	14	3.8	17	4.3	17	4.1	15	3.5	26	5.6
Total Surgeons	276	100.0	282	100.0	310	100.0	330	100.0	366	100.0	393	100.0	411	100.0	424	100.0	466	100.0
Anesthesiologists	39		38		46		55		61		60		64		65		68	
Total Physicians	886		891		938		1,058		1,054		1,062		1,100		1,145		1,349	

Source: Phoenix Yellow Pages, 1967-1975. Surgeons were classified by "first surgery listing", since many listed more than one specialty. Active was defined to mean listed in the Yellow Pages, under the assumption that inactive surgeons would not be listed. It is possible that some salaried physicians on hospitals are not included in this Exhibit. Further, many of the unclassified physicians—those who did not list surgery specialties can and did perform surgery at Impact and other health care institutions.

Exhibit V-52

Rate of Physicians and Surgeons per 10,000 Population, Maricopa County, 1967-1975

Physician Specialty / Year	1967	1968	1969	1970	1971	1972	1973	1974	1975
All Physicians	10.0	9.8	9.9	10.9	10.4	10.0	9.8	9.7	11.1
All Surgeons	3.1	3.1	3.3	3.4	3.6	3.7	3.7	3.6	3.8
Gynecologists	.84	.86	.79	.91	.87	.90	.83	.82	.85
Otorhinolaryngologists and Ophthamologists	.47	.46	.48	.47	.50	.62	.62	.68	.71
General Surgeons	1.14	1.08	1.28	1.15	1.27	1.26	1.22	1.17	1.08

Source: Phoenix Yellow Pages, 1967-1975. Surgeons were classified by "first surgery listing", since many listed more than one specialty. Active was defined to mean listed in the Yellow Pages, under the assumption that inactive surgeons would not be listed. It is possible that some salaried physicians on hospitals are not included in this Exhibit. Further, many of the unclassified physicians—those who did not list surgery specialities—can and did perform surgery at impact and other health care institutions.

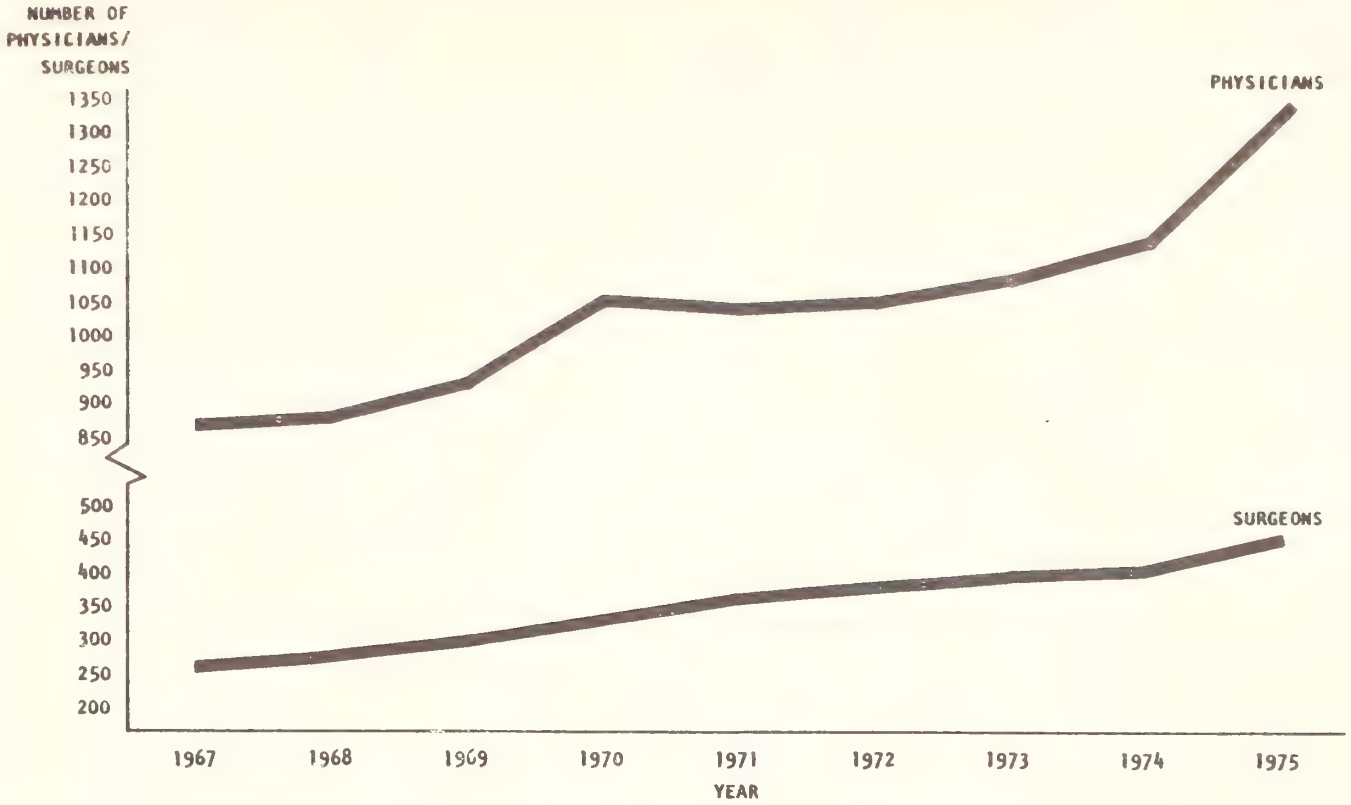
Exhibit V-53

Tests of Significance on Physician and Surgeon Rates

Test Element Physician Specialty	Period	N	R^2	Slope	Intercept	t-Value	5% Significance
All Physicians (9 yrs)	1967-1975	9	.072	.050	9.923	.738	No
All Physicians (8 yrs)	1967-1971	5	.677	.323	8.82	2.89	Yes
All Surgeons	1967-1975	9	.875	.090	3.028	7.009	Yes
Gynecologists	1967-1975	9	.000	.000	.853	-.032	No
Otorhinolaryngologists and Ophthamologists	1967-1975	9	.874	.034	.386	6.733	Yes
General Surgeons	1967-1975	9	.002	.001	1.182	.109	No

Exhibit V-54

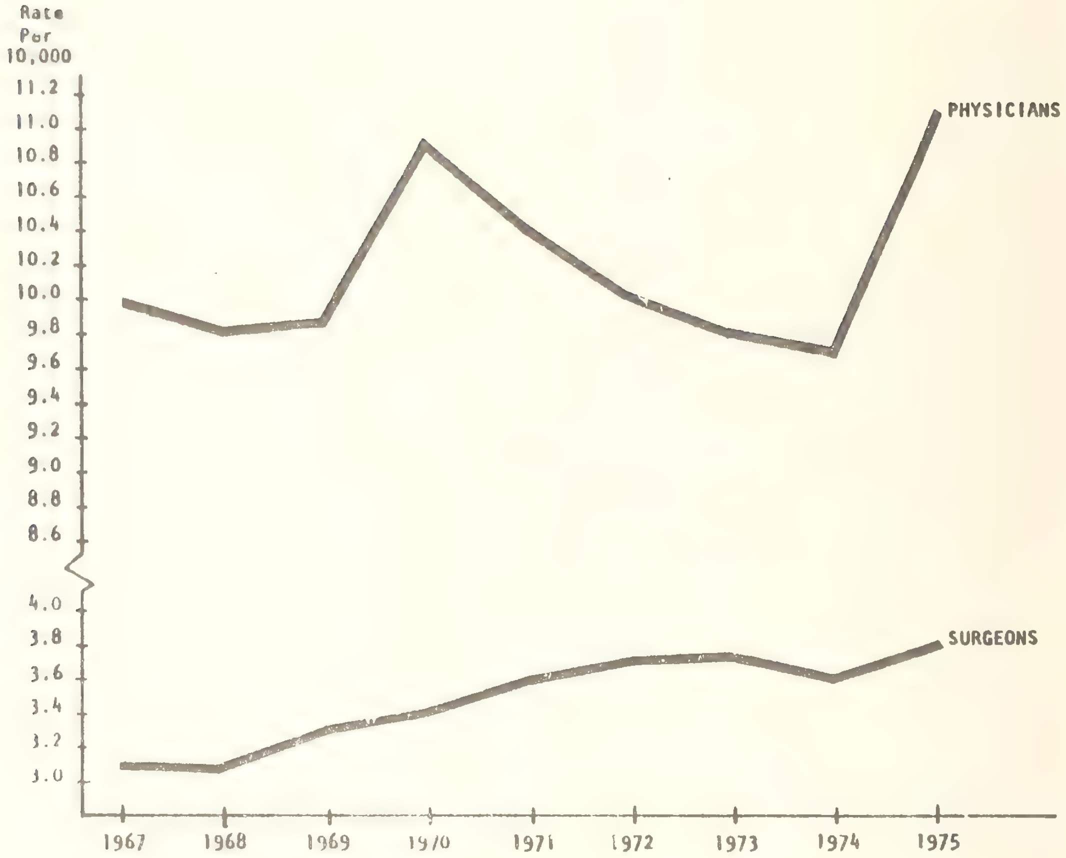
Physicians and Surgeons, Greater Phoenix, 1967-1975



Source: Exhibit V-51

Exhibit V-55

Rate of Physicians and Surgeons Per 10,000 Population,
1967-1975



Source: Exhibit V-51

Changes in the volumes and settings of surgical cases for several subsets of physicians were studied. The two principal physician subsets that were included in the analysis were physicians who were "high volume" Surgicenter physicians in 1975 (defined as those who performed 1% or more of the total Surgicenter case load in that year) and physicians who were "high volume" physicians at the impact hospitals in 1969 (defined as those who performed .5% or more of the total case load at all six impact hospitals in that year). The analysis provided insight into how these groups of physicians changed their loci of surgical practice over the time period.

Exhibits V-56 and V-57 show how 1975 high volume Surgicenter physicians shifted practices among settings and among institutions. As may be seen in Exhibit V-56, in 1969, 95.1% of the cases performed by these physicians were performed in the IP setting. By 1975, only 49.6% of the surgeries performed by this group were done in IP settings with the FSASC Surgicenter settings making up 47.8% of all cases performed by these 29 high volume physicians. The proportion of surgeries performed by this group in the OP and HAASC settings were very small (2.2% and 0.4% respectively in 1975). It is apparent that this group shifted a large part of their surgical practices to the FSASC and not to hospital outpatient or HAASC settings. Exhibit V-57 shows what institutions were the most affected by the shift. Based on the data, it appears that the 1975 high volume Surgicenter physicians were drawn almost entirely from three institutions: St. Joseph's, Good Samaritan, and Memorial. After 1970, all three institutions incurred absolute losses in either total or OP surgery volume. Between 1969 and 1975, these physicians sharply increased their caseloads at Surgicenter, to reach 47.8% in the latter year. They performed hardly any surgery cases at the other three institutions, whether in traditional or HAASC settings. Further, St. Luke's, Scottsdale Memorial, and Phoenix Baptist hospitals did not incur absolute losses in total or OP surgery volumes after 1970.

Exhibit V-56

Distribution of Surgery Cases by Setting of 1975 High-Volume Surgicenter Physicians, 1969, 1972, 1975

Year / Setting	1969		1972		1975	
	Vol	%	Vol	%	Vol	%
Inpatient	4,375	95.1	3,075	58.7	3,388	49.6
Outpatient	225	4.9	400	7.6	150	2.2
FSASC	0	0.0	1,763	33.7	3,262	47.8
HAASC	0	0.0	0	0.0	25	.4
Total	4,600	100.0	5,238	100.0	6,825	100.0
ASF	0	0.0	1,763	33.7	3,287	48.2
AMB	225	4.9	2,163	41.3	3,437	50.4
Cases/Physician	329		181		235	
No. of Physicians[1]	14		29		29	

[1] Only 14 of the 29 high volume Surgicenter physicians were active in 1969.

Note: The shift between traditional and ASF settings is significant at the 5% level with $\chi^2 = 61.2$ with 4 degrees of freedom.

Source: Three-year sample of operating room records and log books. The volume of cases equals the number of cases observed during a 20-day sample multiplied by 12.5 to obtain an estimate of annual volume. Weekend surgery was omitted. A high-volume physician was defined as one performing 1% or more of all surgery cases performed at Surgicenter in 1975.

Exhibit V- 57

Distribution of Surgery Cases by Institution of 1975 High-Volume Surgicenter Physicians in 1969, 1972, 1975

Year	1969		1972		1975	
Institution	Vol	%	Vol	%	Vol	%
Surgicenter	-	-	1,765	33.7	3,262	47.8
Good Samaritan	2,138	46.5	1,884	36.0	2,048	30.0
St. Joseph's	1,713	37.2	1,414	27.0	1,297	19.0
St. Luke's	112	2.5	25	.5	63	.9
Scottsdale Memorial	0	0.0	0	0.0	15	.2
HAASC	-	-	0	0.0	14	.2
Phoenix Baptist	213	4.6	24	.5	62	.9
HAASC	-	-	-	-	16	.2
Memorial	425	9.2	126	2.4	48	.7
Total	4,600	100.0%	5,238	100.0%	6,825	100.0%

Note: First listings for Scottsdale Memorial and Phoenix Baptist are for traditional settings only.
It should not be inferred from these data that a given proportion of procedures can be performed in a particular setting, but only that the designated proportion of each physician's practice was performed at each facility.

Source: Three year sample of operating room records and log books.

The high volume physicians in 1969 showed less of a tendency to shift their practices to ambulatory settings than did the high volume Surgicenter physicians discussed above. As shown in Exhibit V-58, in 1969, 96.3% of the cases performed by the 1969 high volume physicians were performed in the IP setting. By 1975, this proportion had declined to 73.7% in contrast to the 49.6% observed for the high volume Surgicenter physicians. It is interesting to note that where a shift occurred the 1969 high volume physicians were more likely to shift to HAASC than to FSASC setting. It is apparent that there is little overlap between the two groups of physicians. Exhibit V-59 shows that high-volume physicians at Scottsdale Memorial and Phoenix Baptist Hospitals tended to shift settings within institutions. High-volume physicians at these hospitals apparently did little or no surgery at the Surgicenter.

Only six physicians were found to quality as both high volume Surgicenter physicians in 1975 and high volume physicians at the impact institutions in 1969. The distribution of surgery cases for these physicians is given in Exhibits V-60 and V-61. As may be seen from the exhibits, these physicians also shifted their practice from the IP to the FSASC setting between 1969 and 1975. However, the proportional shift was not as great as that observed for all high volume Surgicenter physicians. This tends to confirm the inference that less established physicians become relatively more active at Surgicenter than at traditional settings.

Relationship of Changes in Surgical Resources to Changes in Surgical Demand. In the previous sections, the similarities and dissimilarities of the trends in surgical volumes, surgical rates, and categories of surgical resources were described. In this section, the relationships between the principal dependent and independent variables are further described through the use of correlation and partial correlation analysis. It is recognized that the statistical analysis and tests are severely limited by the restricted number of observations, and furthermore, because we are dealing with time series data we do not have strictly random variables. Data were available for only a nine year period - 1967 through 1975. The middle of this period - 1970 to 1973 - saw a major expansion effort on the part of several of the institutions in Maricopa County which further compounds the problem of investigating relationships between surgical demand and resources because building programs do not add resources such as hospital beds or operating rooms in small increments but, rather,

Exhibit V-58

Distribution of Surgery Cases by Setting of 1969 High-Volume Physicians, 1969, 1972, and 1975

Year / Setting	1969		1972		1975	
	Vol	%	Vol	%	Vol	%
Inpatient	11,263	96.3	8,988	76.6	8,563	73.7
Outpatient	437	3.7	788	6.7	237	2.1
FSASC	0	0.0	912	7.8	1,100	9.5
HAASC	0	0.0	1,050	8.9	1,713	14.7
Total	11,700	100.0	11,738	100.0	11,613	100.0
ASF	0	0.0	1,962	16.7	2,813	24.2
AMB	437	3.0	2,750	23.4	3,050	26.3
Cases/Physician	239		240		237	
No. of Physicians	49		49		49	

Note: The shift between traditional and ASF settings is significant at the 5% level with $\chi^2 = 26.1$ with 4 degrees of freedom.

Source: Three-year sample of operating room records and log books. A high-volume physician was defined as one who performed .5% or more surgery cases of all surgery volume at impact institutions in 1969 and who continued to practice in 1972 and 1975.

Exhibit V-59

Distribution by Institution of Surgery Cases of 1969 High-Volume Physicians, 1969, 1972, and 1975

Year / Institution	1969		1972		1975	
	Vol	%	Vol	%	Vol	%
Surgicenter	-	-	913	7.8	1,100	9.5
Good Samaritan	5,488	46.9	5,138	43.8	4,513	38.9
St. Joseph's	2,050	17.5	1,138	9.7	1,225	10.5
St. Luke's	913	7.8	700	6.0	700	6.0
Scottsdale Memorial	1,838	15.7	1,763	15.1	1,500	12.9
HAASC	-	-	1,050	8.9	1,275	10.9
Phoenix Baptist	988	8.4	837	7.1	700	6.0
HAASC	-	-	-	-	437	3.8
Memorial	425	3.6	187	1.6	163	1.4
Total	11,700	100.0	11,738	100.0	11,613	100.0

Note: First listings for Scottsdale Memorial and Phoenix Baptist are for traditional settings only.

Source: Three-year sample of operating room records and log books.

Exhibit V-60

Distribution of Surgery Cases by Setting of 1975 High-Volume Surgicenter Physicians Not Active in 1969

Year / Setting	1969		1972		1975	
	Vol	%	Vol	%	Vol	%
Inpatient	0	0.0	750	70.0	1,288	42.2
Outpatient	0	0.0	100	8.0	88	2.9
FSASC	0	0.0	400	32.0	1,512	49.6
HAASC	0	0.0	0	0.0	162	5.3
Total	0	0.0	1,250	100.0	3,050	100.0
ASF	0	0.0	400	32.0	1,674	54.9
AMB	0	0.0	500	40.0	1,762	57.8
Cases/Physician	0		83		203	
No. of Physicians	15		15		15	

Source: Three-year sample of operating room records and log books.

Note: The shift between traditional and ASF settings is significant at 5% level with $\chi^2 = 14.9$, with 4 degrees of freedom.

Exhibit V-61

Distribution of Surgery Cases by Setting of 1969 High-Volume Physicians also High-Volume at Surgicenter, 1969, 1972, 1975

Year	1969		1972		1975	
Setting	Vol	%	Vol	%	Vol	%
Inpatient	1,175	91.3	688	54.5	1,075	58.5
Outpatient	113	8.7	113	8.9	13	.7
FSASC	0	0.0	463	36.6	750	40.8
HAASC	0	0.0	0	0.0	0	0.0
Total	1,288	100.0	1,274	100.0	1,838	100.0
ASF	0	0.0	463	36.6	750	40.8
AMB	113	8.7	476	45.5	763	41.5
Cases/Physician	215	▨	210	▨	306	▨
No. of Physicians	6	▨	6	▨	6	▨

Source: Three year sample of operating room records and log books.

Note: The shift between traditional and ASF settings is significant, with $\chi^2 = 56.6$, with 4 degrees of freedom.

s large increases in capacity. Nevertheless, this analysis is ndicative of the basic relationships between surgical volume nd other pertinent variables during the evaluation period.

With these limitations in mind, the results of correlation nalysis should be carefully interpreted as adjunct to, rather han as a replacement for, the descriptive analysis previously iscussed.

Exhibit V-62 gives the coefficients of correlation between urgical volume, population, and the major categories of resources.

It is evident from the high correlation between surgical olume and population that population is a dominant factor in the rowth of the total surgical volume over the time period. The igh intercorrelations between population and the four categories f surgical resources show, as does the descriptive analysis, that he variables of resources and population move together over the ime period - some with a somewhat stronger relationship than thers - but all with a large amount of the variation explained by he population variable (from 79.5% variance explained for beds o 97.2% of the variance explained for surgeons).

A partial correlation coefficient was used in order to escribe basic relationships between surgical volume and resources f population were held constant. Exhibit V-63 presents the esults of this set of partial correlations. It may seen that hen the effects of population are held constant, the variables perating rooms, physicians, and surgeons drop considerably in heir ability to explain the remaining variance. Beds, however, ontinue to explain approximately 50% of the remaining variance. his would suggest that the increase in the total surgical volume ver the time period was, to a great extent driven by the growth n the Maricopa County population and the overall increase in he bed capacities at hospitals in the county.

ummary of Findings

With respect to the changes in surgical resources that ccurred in the Maricopa County area over the time period included n the evaluation, the following principal findings emerged from the analysis.

Exhibit V-62

Correlation Matrix: Total Surgical Volume, Population and Surgical Resources, 1967-1975 (N=9)

Variable	Total Surgical Volume	Population	Beds	Operating Rooms	Physicians	Surgeons
Total Surgical Volume	—	.9914	.9270	.9689	.9101	.9839
Population	.9914	—	.8916	.9696	.9231	.9858
Beds	.9270	.8916	—	.9180	.8123	.9291
Operating Rooms	.9689	.9696	.9180	—	.8311	.9526
Physicians	.9101	.9231	.8123	.8311	—	.9406
Surgeons	.9839	.9858	.9291	.9526	.9406	—

Exhibit V-63

Partial Correlation Coefficients: Total Surgical Volume and Surgical Resources With Population Held Constant, 1969-1975 (N=9)

Variable	Partial Correlation Coefficient
$X_1 \; X_3 \bullet X_2$	.7279
$X_1 \; X_4 \bullet X_2$	.2995
$X_1 \; X_5 \bullet X_2$	.2387
$X_1 \; X_6 \bullet X_2$	.1006

Where: X_1 = Total Surgical Volume

X_2 = Population

X_3 = Beds

X_4 = Operating Rooms

X_5 = Physicians

X_6 = Surgeons

- After the introduction of the FSASC in 1970, the surgical center concept was widely replicated in Maricopa County by hospitals and several physician groups that planned and developed ambulatory surgical facilities based on the Surgicenter.

- By the end of 1976, three hospital-affiliated ambulatory surgical facilities (Phoenix Baptist, Scottsdale Memorial, and Phoenix General Hospitals) had opened in Maricopa County and one had been approved for opening in July, 1977. None of these facilities were located in the immediate vicinty of Surgicenter or competed directly with the Surgicenter for patients and physicians.

- Since the opening of the Surgicenter in 1970, four additional freestanding ambulatory surgical centers had opened. All are surgeon-owned and controlled. Only one is located in the immediate vicinity of the Surgicenter. Two are located in the eastern metropolitan area in the communities of Mesa and Tempe. The fourth is located in west Phoenix in the same area as Phoenix Baptist Hospital.

- The number of hospital beds at institutions in Maricopa County rose substantially in the 1970's moving from 3458 beds in 1969 to 4549 beds in 1975—a 31.6% increase—with the major increases occurring 1970 and 1972.

- The bed capacity per 1000 population also showed major increases in both 1970 and 1972. After 1972 the bed rate declined to 1967 levels as the population growth in Maricopa County caught up with the building expansion and some beds were taken out of service. The first major increase in the bed rate in 1970 corresponds with the increase in the inpatient surgery rate noted for that year.

- The number of operating rooms in Maricopa County increased substantially during the period 1968 to 1975 with 83 ORs in 1968 and 124 ORs in 1975 - a 49.4% increase. The operating rooms per 100,000 population increased very little between 1968 and 1971 with the major increase occurring in 1972 and 1973. The primary component of the increase in the OR rate between 1968 and 1973 was the development of ORs at the ambulatory surgical facilities.

- The two step increases in the total surgery rate for Maricopa County in 1970 and 1973 were accompanied by the increased hospital bed rate in 1970 caused by a major expansion of inpatient facilities in that year and by the increase in the operating room rate in 1973 that reflects the opening of additional operating rooms dedicated to ambulatory surgery in hospital and non-hospital settings.

- The total number of physicians practicing in Maricopa County increased by 59.2% over the period 1966 through 1975. The number of surgeons increased by 70.7% during the same period.

- The number of physicians per thousand population in Maricopa county fluctuated widely over the time period, however, a major increase was noted in 1970 and again in 1975. The surgeon rate increased consistently over the time period with no major gains noted in any single year.

- Based on the correlation analysis, it appears that the increase in the surgical volume was most strongly associated with the increase in the Maricopa County population and with the number of beds. If the population is held constant the number of operating rooms, physicians, and surgeons lose explanatory power.

FINDINGS RELATED TO HOSPITAL REVENUES, EXPENSES, AND PRICES

In this section changes in hospital revenues, expenses, and prices related to the provision of surgical services are discussed. Information for this analysis was obtained from discussions with hospital personnel and review of this Medicare Cost Reports for the six impact hospitals included in the study.

Changes in Net Revenues and the Net Revenue Rate

Net revenue and net revenue rate are two important summary measures of the financial performance of an institution. Net revenue is defined as total revenue less total expenses. The net revenue rate is analogous to return on sales (i.e. net revenue as a percent of total revenue). Obviously many factors could and did change both revenues and expenses at the impact institutions over the time period. The summary experience of the hospitals is shown in Exhibit V-64 which presents the net revenue per inpatient stay for the impact hospitals from 1968 to 1975. The net revenue rate is also given for the six hospitals aggregated. It should be noted that all hospital revenue and cost centers were included in these calculations.

Considerable variation in the net revenue per inpatient day is noted both between institutions and over time. Generally, however, it may be seen that net revenues per patient day for all hospitals taken together moved sharply upward in 1970 to \$18.78 from \$4.09 in 1969. After 1970 the net revenue per patient day fluctuated between a low of \$11.48 in 1971 and \$19.40 in 1974. The net revenue rate for the hospitals peaked in 1970 at 15.5%, moved downward in 1971 to 8.7% and remained relatively suppressed through the end of the period included in the evaluation. The net revenue rate in 1968 and 1969 was low, perhaps because some impact hospitals were incurring additional costs in connection with their expansion programs. The net revenue rate did not change significantly over the time served, except for the peak in 1970.

Although changes in the total hospital net revenue rate did not exhibit a consistent pattern, the net revenue rate for the operating and recovery rooms at the impact hospitals declined significantly between 1968 and 1975, from 50.6% in 1968 to 37.7%

Exhibit V-64

Net Revenue Per Inpatient Day at Impact Hospitals, 1968-1975

Year Hospital	1968	1969	1970	1971	1972	1973	1974	1975
Good Samaritan	$ 2.09	$-8.34	$18.29	$20.74	$20.82	$22.59	$15.96	$27.31
St. Joseph's	4.79	11.33	8.19	10.74	13.26	15.94	13.57	21.12
St. Luke's	10.23	17.56	11.30	3.5	-6.70	N/A	N/A	-9.01
Phoenix Baptist	12.54	21.28	24.65	23.57	24.32	25.83	11.90	N/A
Scottsdale Memorial	14.75	18.93	29.62	22.43	16.29	17.17	20.01	17.28
Memorial	6.79	10.38	N/A	7.37	-2.91	-22.98	32.83	-9.93
ALL HOSPITALS	5.86	4.09	18.78	11.48	16.94	17.56	19.40	15.35
NET REVENUE RATE	7.1%	4.1%	15.5%	8.7%	10.9%	11.5%	9.7%	8.5%

SOURCE: Medicare Cost Reports, maintained by Arizona Blue Cross. Net revenue equals total hospital revenues less total expenses. Most years are fiscal years, though not all.

N/A: In these cases, the revenue information could not be derived from the available data.

in 1975. Exhibit V-65 presents the net revenue per surgery case from the operating and recovery rooms at the impact hospitals and the net revenue rate for this cost center. The net revenue per case varied considerably between institutions; however, in aggregate, the operating room net revenues per case rose more or less consistently from $46.32 in 1968 to $77.08 in 1975 a 66.4% increase over the eight year period. The increase in the net revenue per surgery case from operating rooms and the significant decline in the net revenue rate from this cost center may reflect changes in the case mix of surgery patients over the time period. If proportionately more complex surgical patients are being treated in the hospital inpatient setting after the opening of the FSASC and HAASCs the cost per case may be increasing both absolutely and as a proportion of operating room revenue. This may be particularly true if, in fact, the minor surgery cases which, as previously noted, were shifted to the ambulatory surgical settings were profitable surgical services for the hospitals to provide. The period of Surgicenter's operations, 1970-1975, saw inconsequential changes in both hospital and operating room net revenues, while net revenue rates for operating rooms declined. The changes in the net revenue rate may also be related to changes in the pricing policies of the hospitals over the time period and the extent to which operating room revenue center cross subsidized other hospital departments. Tests of significance for changes in hospital and operating room net revenues and net revenue rates are given in Exhibit V-66.

Throughout the period 1968 to 1975, little overall change was noted in the proportion that operating room revenue made up of total hospital revenue although considerable variation between hospitals was observed. As shown in Ehxibit V-67, the overall proportion was 8.2% in 1968 and 8.3% in 1975. Good Samaritan, St. Joseph's, St. Luke's and Scottsdale Memorial generally had slightly larger proportions of total revenues from the operating room then did Phoenix Baptist and Memorial hospitals.

Changes in Prices. As shown in Exhibit V-68, prices in current dollars for major and minor surgery rose substantially between 1969 and 1975. Major surgery includes most IPO procedures while minor surgery includes many OPE procedures. Prices for traditional operating surgery rose substantially between 1969

Exhibit V- 65

Net Revenue per Surgery Case From Operating Rooms at Impact Hospitals, 1968-1975

Year Hospital	1968	1969	1970	1971	1972	1973	1974	1975
Good Samaritan	$47.86	$72.44	$58.59	$63.12	$ 56.86	$70.79	$52.25	$81.12
St. Joseph's	34.82	61.98	66.58	91.23	127.55	97.33	99.39	91.59
St. Luke's	18.43	31.84	47.90	81.05	82.53	N/A	N/A	77.06
Phoenix Baptist	44.81	35.85	44.93	44.58	44.21	27.33	35.61	N/A
Scottsdale Memorial	35.03	54.27	49.59	38.30	51.02	56.91	47.95	51.27
Memorial	22.85	17.17	N/A	21.15	47.51	28.96	30.05	65.56
All Hospitals ($\bar{x}$)	46.32	59.08	57.01	67.71	67.37	62.34	66.58	77.08
Net Revenue Rate	50.6%	51.6%	50.4%	49.2%	42.2%	38.2%	39.9%	37.7%

Source: Medicare Cost Reports, maintained by Arizona Blue Cross. Net revenues are divided through by annual surgery volumes. Net revenues of operating rooms equals total revenues allocated to operating rooms (i.e., operating and recovery room charges) less all operating expenses of operating rooms. Depreciation is not included.

Exhibit V-66

Tests of Significance on Hospital and Operating Room Net Revenues and Net Revenue Rates

Test Values / Variable	Period	R^2	Slope	Intercept	t-Value	Significant at 5% level
Hospital Net Revenue	1968-1975	.509	1.724	5.927	2.496	Yes
Hospital Net Revenue	1970-1975	.018	.206	15.862	.270	No
Hospital Net Revenue Rate	1968-1975	.057	.333	8.000	.615	No
Hospital Net Revenue Rate	1970-1975	.420	-.897	13.941	-1.703	No
Operating Room Net Revenue	1968-1975	.785	3.025	49.700	4.673	Yes
Operating Room Net Revenue	1970-1975	.545	2.627	57.155	2.186	No
Operating Room Net Revenue Rate	1968-1975	.864	-2.29	55.280	-6.174	Yes

Source: Previous Exhibits

Exhibit V-67

Proportion of Total Revenue Made Up By Operating Room Revenue for Impact Hospitals, 1968-1975

Year Hospital	1968	1969	1970	1971	1972	1973	1974	1975
Good Samaritan	.083	.099	.070	.075	.071	.076	.081	.078
St. Joseph's	.074	.089	.089	.106	.102	.101	.097	.093
St. Luke's	.067	.076	.086	.083	.080	N/A	N/A	.089
Scottsdale Memorial	.074	.086	.085	.078	.078	.081	.086	.094
Phoenix Baptist	.083	.069	.067	.066	.069	.069	.067	N/A
Memorial	.062	.049	N/A	.057	.065	.065	.064	.068
TOTAL	.082	.083	.078	.083	.081	.083	.084	.083

SOURCE: Individual Institutions and Medicare Cost Reports.

Exhibit V-68

Operating and Recovery Room Prices Per Hour at Impact Hospitals, 1969, 1972, 1975

Year / Hospital	1969			1972			1975		
	Major	Minor	RR	Major	Minor	RR	Major	Minor	RR
Good Samaritan	$70.00	$60.00	$25.00	$85.00	$65.00	$32.00	$104.00	$81.00	$35.00
St. Joseph's	70.00	60.00	25.00	88.00	65.00	35.00	96.80	71.50	42.00
St. Luke's	80.00	65.00	15.00	80.00	65.00	15.00	134.00	94.00	27.50
Scottsdale Memorial	80.00	55.00	15.00	80.00	55.00	15.00	100.00	75.00	23.00
Phoenix Baptist	60.00	45.00	20.00	60.00	45.00	20.00	90.00	75.00	35.00
Memorial	55.00	37.50	6.00	70.00	50.00	15.00	88.00	66.00	22.00
Weighted Mean	70.43	57.85	21.08	81.82	61.13	21.86	102.15	77.62	32.69

Source: Individual hospitals, for 1969 and 1972. Arizona State Bureau of Health Economics for 1975. Good Samaritan 1969 prices were not available so prices were set equal to those at St. Joseph's, a hospital with which Good Samaritan shares many characteristics. Major surgery includes only IPO cases, while minor surgery includes some IPO and most OPE procedures. Prices weighted by market shares of surgery volume at impact institutions to obtain Weighted Means.

and 1975. Prices for traditional operating rooms are set per unit time in most instances. Distinctions were made at impact hospitals among surgery cases mostly on the basis of temporal differences in operating room utilization. Hence, charges for similar cases could conceivably differ a great deal while charges for quite different cases could be similar. Cases that required substantial labor and equipment time would tend to be subsidized by less resource-intensive cases.

Prices for major surgery at the impact institutions rose by 45.0% between 1969 and 1975, much more than the increase of 34.2% that occurred for prices of minor surgery. Price changes in minor surgery occurred entirely between 1972 and 1975. Between 1969 and 1972 minor surgery prices increased by only 6% as compared to 16% for major surgery.

In 1969, most impact hospitals did not differentiate operating room prices among procedures. The only differentiation, typically, was between major and minor surgery. The advent of Surgicenter was followed by some moves among impact hospitals toward flat fees for certain OP and OPE procedures, and thereby to begin differentiation among some types of surgery cases. St. Joseph's Hospital has had special operating room rates for certain OP and OPE procedures since the late sixties. With the opening of their HAASCs, Scottsdale Memorial and Phoenix Baptist, set flat fees for a wide range of procedures. In 1972, Good Samaritan set a specific operating room rate for OP procedures. That same year, St. Luke's divided its operating room price structure into four classes ranked on the basis of average procedure utilization of operating rooms. In 1975, Memorial Hospital initiated flat fees for a number of OP and OPE procedures. Both special operating room rates and flat fees probably represent competitive responses to Surgicenter. As shown in Exhibit V-69, special operating room rates have remained constant since their inception probably to maintain competition with Surgicenter. Exhibit V-70 shows how flat fees for some ambulatory procedures vary among impact institutions in 1975.

These moves to differentiate operating room prices occurred at least partly in response to the challenge posed by Surgicenter. However, these moves should not be overstressed. Prices in traditional operating rooms have generally remained hourly rates. Flat

Exhibit V-69

Special Operating Room Rates[1] at Impact Institutions, 1970-1975

Year / Institution and Rate	1970	1971	1972	1973	1974	1975
Good Samaritan: OP Rate	N/A	N/A	$40	$40	$40	$40
St. Joseph's: T&A	$50	$50	50	50	50	50
D&C	50	50	50	50	50	50
St. Luke's Class I	N/A	N/A	N/A	73	73	73

[1] Price is only for occupancy of operating room and does not include supplies, anesthesia, use of recovery room, etc.

Source: Individual institutions' business offices.

Exhibit V-70

Flat Fees for Selected Procedures at Impact Institutions, 1975

Procedure / Institution and Setting	Adenoidectomy with Myringotomy	Excision of Breast Mass	Dilation and Curettage	Laparoscopy	Cystoscopy
Phoenix Baptist, HAASC	$115.00	$140.00	$115.00	$160.00	$115.00
Scottsdale Memorial, HAASC	112.00	150.00	112.00	187.00	112.00
Memorial, OP	110.00	120.00	90.00	153.75	120.00
Surgicenter, FSASC	121.00	131.00	121.00	157.00	110.00

Source: Arizona Bureau of Health Economics fees in traditional hospital surgical settings have been set only for a few specifically identifiable OPE procedures.

As shown in Exhibit V-71, semi-private hospital room rates per patient day have steadily advanced at the impact hospitals since 1969. The FSASC seems to have had little or no effect on the changes in room rates.

Summary of Findings

The analysis of institutional revenues, expenses, and prices at the impact institutions in Maricopa County resulted in the following principal findings.

- For the impact institutions, the total hospital net revenues per inpatient day fluctuated widely between 1968 and 1975, however after 1970 there was no discernible trend in the net revenues per inpatient day.
- The total hospital net revenue rate also fluctuated considerably. However, no consistent pattern was observed over the time period.
- The net revenues from operating and recovery rooms per surgery case at the impact hospitals increased over the time period from $46.32 in 1968 to $77.08 in 1975.
- The net revenue rate for the operating and recovery rooms declined significantly from 50.6% in 1968 to 37.7% in 1975. The decline in the rate was statistically significant. The introduction of the FSASCs, and the HAASCs apparently affected the rate of return from the operating rooms by increasing the surgical mix complexity at the inpatient institutions.
- According to hospital administrators, the introduction of the FSASCs and the HAASCs did not produce financial insolvency or any major disruption in the financial stability of the impact institutions between 1970 and 1975.

Exhibit V-71

Semi-Private Room Rates (Per Day) at Impact Hospitals, 1969, 1972, 1975

Year Hospital	1969	1972	1975
Good Samaritan	$47.00	$66.00	$79.00
St. Josephs	47.00	62.00	77.00
St. Lukes	42.00	60.00	80.00
Scottsdale Memorial	47.00	48.00	69.00
Phoenix Baptist	50.00	53.00	73.00
Memorial	44.00	55.00	69.00
Weighted Mean	$46.59	$60.79	$76.65

SOURCE: Individual hospitals for 1969. Arizona Bureau of Health Economics for 1972 and 1975. Weights were calculated on the basis of inpatient days.

- The introduction of the FSASC in 1970 seems to have had little or no effect on the proportion of total hospital revenues derived from operating rooms at the impact institutions.

- After the introduction of the FSASC, hospitals reacted by introducing flat fee per procedure pricing for a limited number of procedures done in traditional outpatient surgical settings.

- According to hospital administrators and procedure fee schedules, hospitals that opened HAASCs set their prices for procedures to be competitive with the FSASC.

- Prices for minor surgery at the impact institutions increased by 34% over the time period as compared with 45% for major surgery prices.

PROCEDURE-SPECIFIC ANALYSIS

The aggregate analyses established that the FSASCs and the HAASCs drew significant volumes of OP and OPE cases from traditional hospital inpatient and outpatient settings at the same time the total surgery rates in Maricopa County were increasing. Additional evidence of the substitution between inpatient and ambulatory surgical settings is provided by the analysis of the frequency of occurance of specific surgical procedures.

Twenty specific procedures were selected for analysis at the principal impact institutions. The frequency of each procedure was tracked by setting, patient characteristics, and procedure characteristics for the years 1969, 1972 and 1975. The selected procedures were composed of the twenty most frequent procedures at Surgicenter during the period 1972 to 1975. In this section, procedures are analyzed in terms of:

- Trends in volumes by surgical setting for 1969, 1972 and 1975
- Changes in case characteristics
- Changes in volumes and rates of 20 procedures.

In addition, the twenty procedures (listed in Exhibit V-80) taken together are analyzed in terms of selected patient characteristics. The purpose of this analysis is to determine how these procedures shifted among settings and why. Because of the prominent role of the selected procedures at ASF settings, focusing on them will provide insights into the dynamics of inter-setting substitution.

Trends in Volume of Cases Containing Selected Procedures

The twenty procedures chosen for intensive analysis shifted more to ASFs than did OPE cases generally. As shown in Exhibit V-72 the volume of cases containing selected procedures increased substantially between 1969 and 1975 at the seven primary impact institutions. They were evidently the high-growth procedures. Cases containing them expanded by approximately 66.0%—much faster than the total number of sampled cases which grew by 38.% between 1969 and 1975. The shift to ASF settings was substantial: cases performed at ASFs rose from 0% in 1969 to 33% in 1972, and to 50.7% in 1975. The proportion of these cases done on an ambulatory basis rose from 5.6% in 1969 to 55.8% in 1975. Volume done at HAASC settings increased dramatically between 1972 and 1975. Since the volume of cases done at traditional settings declined both relatively and absolutely, there is no question that a massive amount of substitution took place between settings.

Cases containing selected procedures constituted a substantial share of total surgery, taking by 1975 a 28.6% share of all cases and 68.3% at the FSASC as shown in Exhibit V-73. The proportion of selected to total cases increased over time due to the predominance of some high-growth procedures. As expected, the proportion of selected IP to total IP cases declined substantially, reflecting shifts of these procedures to ASF settings. The increasing proportion of selected procedures may also be accounted for by widening diffusion of relatively new procedures.

Exhibit V-72

Volume and Proportion of Cases Containing Selected Procedures by Setting at Impact Institutions, 1969, 1972, 1975

YEAR / SETTING	1969		1972		1975	
	VOLUME	%	VOLUME	%	VOLUME	%
IP	7613	94.4%	6200	59.3%	5875	43.8
OP	450	5.6	788	7.5	725	5.4
HAASC	0	0.0	575	5.5	2150	16.1
FSASC	0	0.0	2888	27.6	4638	34.6
TOTAL	8063	100.0	10450	100.0	13388	100.0
ASF	0	0.0	3463	33.1	6788	50.7
AMB	450	5.6	4251	40.6	7513	56.1

Source: Three-year sample of operating room records at impact institutions. Sample observations were multiplied by 12.5 per annual estimates.

Note: The shift between traditional and ASF settings is significant, with $\chi^2 = 56.03$ with 2 degrees of freedom

Exhibit V-73

Proportion of Cases Containing Selected Procedures To all Cases, By Setting at Impact Institutions, 1969, 1972, 1975

SETTING \ YEAR	1969	1972	1975
IP	24.4%	21.9%	17.7%
OP	17.4	20.0	36.5
HAASC	0.0	34.6	44.7
FSASC	0.0	55.9	68.3
TOTAL	23.8	24.4	28.6
ASF	0.0	50.7	58.6
AMB	17.4	39.5	55.3

Source: Three-year sample of operating room records at impact institutions.

As shown in Exhibits V-74 and V-75 surgery rate of selected cases increased significantly between 1969 and 1975 by 28.9% from 68.2 cases per ten thousand to 87.9. The OP surgery rate did not change significantly although a 23.7% increase can be observed between 1969 and 1975, perhaps due to some inter-setting substitution within traditional operating rooms. The decline in the IP surgery rate was significant and considerably larger than the decline in the IP rate for all cases. The rate for selected cases at AMB settings increased sharply, twelvefold between 1969 and 1975. As expected surgery rates for cases at ASFs increased dramatically. Declines in rates for selected cases done at traditional settings are substantially less in absolute value than increases for cases done at the FSASC and the HAASC. Since the surgery rate for all cases grew by 12.1% between 1969 and 1975 and for selected cases grew by 18.9%, some of the individual procedures were growing very rapidly indeed. The evidence on surgery rates suggests strongly that for selected procedures, both substitution among settings and new utilization play a major role.

Changes in Case Characteristics

Changes in characteristics of cases with selected procedures may help account for changes in volumes and rates. The following characteristics were assessed:

- Type
- Complexity
- Patient age
- Means of payment.

Type. The selected cases may be either IPO or OPE. Because all selected procedures are OPE by definition, a case (containing any type of procedure) can be IPO if it contains at least one IPO procedure. All cases done at ASF settings are OPE. At IP settings, although the number of IPO cases fell, the proportion and absolute number of IPO cases rose. As shown in Exhibit V-75 and V-76, the volume of IPO cases increased by about 39%, about the same increase as occurred in total volume of cases. The decline in proportion of OPE cases done at IP settings is undoubtedly due to shifts to ASF settings.

Exhibit V-74

Number of Surgery Cases per 10,000 Population Containing Selected Surgery Procedures by Setting at Impact Institutions, 1969, 1972, 1975

Setting \ Year	1969	1972	1975
IP	64.4	46.5	38.6
OP	3.8	5.9	4.7
FSASC	0.0	21.7	30.5
HAASC	0.0	4.3	14.1
ASF	0.0	26.0	44.6
AMB	3.8	31.9	49.3
Total	68.2	78.4	87.9

Source: Three year sample of operating room records at impact institutions.

Exhibit V-75

Distribution of Twenty Procedure Cases at All Settings By Type, 1969, 1972, 1975

Year / Type	1969		1972		1975	
	Vol	%	Vol	%	Vol	%
IPO	495	6.5%	322	5.2%	687	11.7%
OPE	7,118	93.5	5,878	94.8	5,188	88.3

Source: Three-year sample of operating room records at impact institutions

Exhibit V-76

Proportion of Surgical Cases Performed in Each Setting, of a Given Complexity, at Impact Institutions, 1969, 1972, 1975

YEAR/ COMPLEXITY	1969			1972			1975		
SETTING-TYPE	SINGLE OPE %	MULTI OPE %	MIXED %	SINGLE OPE %	MULTI OPE %	MIXED %	SINGLE OPE %	MULTI OPE %	MIXED %
IP/IPO	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	100.0
IP/OPE	64.7	35.3	0.0	71.9	28.1	0.0	74.0	26.0	0.0
OP	88.9	11.1	0.0	85.7	14.3	0.0	87.9	12.1	0.0
HAASC	-	-	-	80.4	19.6	0.0	77.9	22.1	0.0
FSASC	-	-	-	76.1	23.9	0.0	67.9	32.1	0.0
ALL SETTINGS	62.1	31.8	6.1	72.3	24.3	3.4	69.5	25.3	5.2

Source: Three-year sample of operating room records at impact institutions

Complexity. Complexity was defined as a dimension consisting of the following categories:

- Single-OPE (least complex)
- Multi-OPE
- Mixed-IPO & OPE (most complex).

It was hypothesized that the FSASCs and the HAASCs would draw mostly on single OPE cases, and tend to leave multi-OPE cases in IP settings. Upon disaggregating selected cases by complexity, caseloads at ASFs were less complex (in a limited sense) than caseloads at IP settings. As shown in Exhibit V-76, between 1972 and 1975, however, selected cases at the FSASC and HAASC settings became more complex. Although the overall proportion of multi-OPE cases declines between 1969 and 1975, FSASC and HAASC settings performed a larger proportion of multi-OPE cases. By 1975, the caseload at Surgicenter was more complex than that at IP settings. Single OPE cases were most concentrated at traditional OP settings. Complexity of cases in IP settings declined at all settings suggesting that ASFs were drawing off multi-OPE cases from IP settings more than proportionately toward the end of the period. It is not complexity of those cases that keeps some cases in IP settings. The proportion of single OPE cases increased between 1969 and 1972, while the proportion of multi-OPE and mixed cases fell. The trends were reversed between 1972 and 1975. It is possible that, initially, Surgicenter and the HAASCs specialized in single-OPE procedures, but that, over time, with increased institutional experience, more multi-OPE procedures were performed.

Patient Age. One factor in determining the appropriateness of the surgical setting is the age of the patient. As shown in Exhibits V-77 and V-78, the aged, as well as those between 45 and 64, tended to be disproportionately distributed in IP settings. Nonetheless for these minor procedures, the proportion of the aged treated in IP settings declined from 95.3% in 1969 to 81.5% in 1975, suggesting that ASFs were beginning to draw aged OPE cases out of IP settings. In the age group 15 to 44 years, the proportions treated at IP settings declined from 93.3% in 1979 to 36.9% in 1975, a greater decline than occurred for all selected

Exhibit V-77

Distribution of Selected Surgical Cases by Age Group at Impact Institutions, 1969, 1972, 1975

AGE \ YEAR	1969 %	1972 %	1975 %
0-1	2.8	4.5	3.9
2-14	23.1	21.5	13.6
15-44	45.0	47.4	57.3
45-64	18.7	18.1	17.3
65 +	9.4	8.5	8.0
ALL AGES	100.0	100.0	100.0

Source: Three-year sample of operating room records at impact institutions

Exhibit V-78

Distribution of Patients Undergoing Surgery by Surgical Setting and by Age at Impact Institutions for Selected Cases 1969, 1972 and 1975

Proportion in Each Age Category

AGE-YEAR / SETTING TYPE	15 - 44			65 +		
	1969	1972	1975	1969	1972	1975
IP/IPO	5.6	4.1	4.9	16.7	11.5	8.6
IP/OPE	87.7	53.7	32.0	78.6	82.4	72.9
OP	6.7	10.4	6.9	4.8	5.9	2.9
HAASC	0.0	0.0	18.4	0.0	0.0	10.0
FSASC	0.0	31.9	37.8	0.0	5.9	5.7
ALL SETTINGS	100.0	100.0	100.0	100.0	100.0	100.0

Source: Three-year sample of operating room records at impact institutions

cases. The evidence indicates, then, that the aged are indeed less likely to be treated at ASFs than other age groups. The age group most likely to be shifted is that between the ages 15 and 44. In the overall Maricopa County population, the latter age group grew faster than any other, a factor that helps account for some of the growth of surgery at ASFs.

Means of Payment - Although information on source of payment for selected cases proved difficult to obtain, Exhibit V-79 provides a basis for making several tentative conclusions:

- Medicare cases were less likely to be shifted to FSASC than other cases
- Out-of-pocket payors were more likely to shift to the FSASC than other cases, and
- Charity and welfare cases after 1969 declined sharply, at all settings.

Percent Medicare of selected cases declined from 8.9% in 1969 to 4.1% in 1975. By 1975, about three quarters of cases covered by private insurance carriers had shifted to ASFs, while only one quarter of Medicare cases had done so. Shifts of Medicare cases were apparently hampered by such factors as patient age and perceived medical risk of ambulatory treatment. Patients who paid out-of pocket, though a relatively small portion of all surgeries, apparently were shifted to the FSASC and the HAASCs. Apparently, for the selected cases, charity and welfare patients were handled for the most part at Maricopa County General Hospital. Patients covered by commercial carriers and Blue Cross were most likely to shift to FSASC and HAASC settings. In sum, patients drawn to Surgicenter and the HAASCs belonged disproportionately to the age group of 15 to 44 years, and were less likely to be covered by Medicare or local welfare. Surgicenter and the HAASCs initially concentrated on single OPE cases but later began performing more multi-OPE cases.

Exhibit V-79

Distribution of Selected Procedures by Setting and Means of Payment at Impact Institutions, 1969 and 1975

Year/Payment Source Setting	1969				1975			
	Out of Pocket	Medi-Care	Charity Welfare	Blue Cross Commercial Industrial	Out of Pocket	Medi-Care	Charity Welfare	Blue Cross Commercial Industrial
IP	96.7%	96.6%	76.2%	95.8%	15.9%	75.0%	83.3%	24.6%
OP	3.3	3.4	23.8	6.2	0.0	0.0	16.7	.2
HAASC	.0	.0	.0	.0	13.6	14.3	0.0	13.8
FSASC*	.0	.0	.0	.0	70.5	10.7	0.0	61.4
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Proportion for Payment Sources by Year	9.2%	8.9%	6.4%	75.5%	6.5%	4.1%	.9%	88.6%

Source: Three-year sample of operating room records at impact institutions

*It should be understood that throughout this report, the FSASC setting is represented by only one facility, the Surgicenter, whereas each of the other settings is represented by at least two facilities.

Changes in Volumes and Rates of Twenty Procedures

The selected procedures were chosen on the basis of their volumes at the FSASC. Not surprisingly, as a group these procedures grew faster than other procedures, whether IPO or OPE, and were shifted disproportionately to the FSASC and the HAASCs. The volume of each procedure by setting and type for the years 1969, 1972 and 1975 is shown in Exhibit V-80. Most procedures experienced substantial shifts to ASF settings. Type is listed to permit identification of selected procedures performed together with IPO procedures. With some exceptions—dilation and curettage, breast biopsies, and excisions of lipomas, and sebaceous cysts—hardly any procedures were contained in mixed cases. For twelve procedures, volumes of cases performed at IP settings declined between 1969 and 1975. Volumes at OP settings were typically low. Fifteen procedures increased in volume between 1969 and 1975. Five procedures declined in volume.

Some procedures play more significant roles in the make up of the overall volume of surgery than others. Exhibit V-81 shows how proportions for both the total and OPE procedure volumes have changed between 1969 and 1975 at impact institutions. For example, in 1975 cases containing inguinal herniorrhaphies took a 5.32% share of all OPE surgery cases, and a 3.73% share of all surgery cases in 1975 from the impact institutions. In 1975, the following nine procedures exceeded 1% of total surgery volume:

- Adenoidectomies - 2.64%
- Tonsillectomies - 2.75%
- Myringotomies with tubes - 1.81%
- Dilation and curettage (diagnostic) (D&C) - 8.62%
- Laparoscopies (diagnostic) - 2.16%
- Laparoscopies with bilateral tubal coagulation (BTC) - 2.86%
- Breast Biopsies - 2.80%
- Inguinal Herniorrhaphies - 3.73%
- Excisions of Lipoma - 1.07%

Exhibit V-80

Estimates of Volume of Twenty Surgery Procedures by Setting and Procedure Type at Impact Institutions, 1969, 1972, 1975

Setting / Procedure		IP-IPO		IP-OPE		OP		FSASC		HAASC		TOTAL
		#	%	#	%	#	%	#	%	#	%	
Adenoidectomy	1969	0	0.0	1100	100.0	0	0.0	0	0.0	0	0.0	1100
	1972	0	0.0	912	68.9	62	4.7	313	23.6	38	2.8	1325
	1975	0	0.0	687	55.5	0	0.0	363	29.3	188	15.2	1236
Tonsillectomy	1969	0	0.0	1525	99.2	13	.8	0	0.0	0	0.0	1538
	1972	0	0.0	1675	95.7	50	2.9	25	1.4	0	0.0	1750
	1975	0	0.0	1075	83.5	0	0.0	50	3.9	163	12.6	1288
Myringotomy No Tubes	1969	0	0.0	213	100.0	0	0.0	0	0.0	0	0.0	213
	1972	0	0.0	162	64.8	0	0.0	63	25.2	25	10.0	250
	1975	0	0.0	38	50.0	0	0.0	0	0.0	37	50.0	75
Myringotomy With Tubes	1969	0	0.0	600	85.7	75	11.1	0	0.0	0	0.0	675
	1972	0	0.0	225	25.7	75	8.6	480	57.1	75	8.6	875
	1975	0	0.0	175	20.6	13	1.5	187	22.1	475	55.9	850
Dilation and Curettage (Diagnostic)	1969	213	7.9	2262	84.2	213	7.9	0	0.0	0	0.0	2688
	1972	225	7.4	1188	38.8	250	8.2	1150	37.5	250	8.2	3063
	1975	313	7.7	713	17.6	375	9.3	1800	44.6	837	20.7	4038
Laparoscopy (Diagnostic)	1969	0	0.0	38	75.0	12	25.0	0	0.0	0	0.0	50
	1972	0	0.0	138	57.9	25	10.5	75	31.6	0	0.0	238
	1975	75	7.4	238	23.5	38	3.7	613	60.5	50	4.9	1013
Laparoscopy With Bilateral Tubal Coagulation	1969	0	0.0	163	100.0	0	0.0	0	0.0	0	0.0	163
	1972	0	0.0	62	9.4	138	20.8	463	69.8	0	0.0	663
	1975	25	1.9	87	6.5	113	8.4	788	58.9	325	24.3	1338
Marsupialization of Bartholyn Cyst	1969	13	50.0	12	50.0	0	0.0	0	0.0	0	0.0	25
	1972	0	0.0	63	45.5	12	9.1	38	27.3	25	18.2	138
	1975	0	0.0	12	20.0	13	20.0	25	40.0	13	20.0	63
Breast Mass Excision	1969	0	0.0	150	100.0	0	0.0	0	0.0	0	0.0	150
	1972	0	0.0	250	90.9	0	0.0	12	4.5	13	4.5	275
	1975	38	8.8	225	53.0	13	2.9	112	26.5	37	8.8	425
Breast Biopsy	1969	88	13.2	550	83.0	25	3.2	0	0.0	0	0.0	663
	1972	88	12.1	625	86.2	13	1.7	0	0.0	0	0.0	725
	1975	163	12.4	750	57.1	37	2.9	150	11.4	213	16.2	1313
Augmentation Mammoplasty	1969	0	0.0	100	88.9	13	11.1	0	0.0	0	0.0	113
	1972	13	12.5	50	50.0	0	0.0	37	37.5	0	0.0	100
	1975	13	5.6	75	33.3	25	10.2	75	33.3	37	16.7	225

Exhibit V-80 — (cont.)

Setting / Procedure		OP-IPO		IP-OPE*		OP		FSASC		HAASC		TOTAL
		#	%	#	%	#	%	#	%	#	%	
Vasectomy	1969	0	0.0	13	100.0	0	0.0	0	0.0	0	0.0	13
	1972	0	0.0	37	37.5	0	0.0	63	62.5	0	0.0	100
	1975	13	6.2	37	18.8	13	6.3	87	43.8	50	25.0	200
Circumcision	1969	12	12.5	88	87.5	0	0.0	0	0.0	0	0.0	100
	1972	0	0.0	75	50.0	0	0.0	75	50.0	0	0.0	150
	1975	0	0.0	38	15.8	12	5.3	138	57.9	4	21.0	238
Inguinal Herniorrhaphy	1969	12	1.2	963	95.1	37	3.7	0	0.0	0	0.0	1013
	1972	0	0.0	1038	83.0	50	4.0	163	13.0	0	0.0	1250
	1975	50	2.9	1250	71.4	57	2.1	363	20.7	50	2.9	1750
Ganglionectomy	1969	0	0.0	63	62.5	37	37.5	0	0.0	0	0.0	100
	1972	13	5.0	37	15.0	25	10.0	100	40.0	75	30.0	250
	1975	0	0.0	50	28.6	0	0.0	75	42.8	50	28.6	175
Excision of Exostosis	1969	0	0.0	75	100.0	0	0.0	0	0.0	0	0.0	75
	1972	0	0.0	88	77.8	0	0.0	0	0.0	25	22.2	113
	1975	0	0.0	25	40.0	0	0.0	25	40.0	13	20.0	63
Excision of Lipoma or Sebaceous Cyst	1969	138	27.5	337	67.5	25	5.0	0	0.0	0	0.0	500
	1972	0	0.0	338	67.5	100	20.0	25	5.0	37	7.5	500
	1975	13	2.5	300	60.0	25	5.0	75	15.0	87	17.5	500
Removal of Fixation Device	1969	0	0.0	38	100.0	0	0.0	0	0.0	0	0.0	38
	1972	0	0.0	38	60.0	0	0.0	0	0.0	25	40.0	63
	1975	0	0.0	63	33.3	25	13.3	87	46.7	13	6.7	188
Recession Of Eye Muscle	1969	0	0.0	313	100.0	0	0.0	0	0.0	0	0.0	313
	1972	0	0.0	112	50.0	13	5.6	100	44.4	0	0.0	225
	1975	0	0.0	75	46.1	0	0.0	88	53.9	0	0.0	163
Extraction of Teeth	1969	0	0.0	50	100.0	0	0.0	0	0.0	0	0.0	50
	1972	13	11.1	12	11.1	13	11.1	75	66.7	0	0.0	113
	1975	13	5.3	125	52.6	13	5.3	87	36.8	0	0.0	238

SOURCE: Three-year sample of operating room records at impact institutions.

NOTE: The total number of procedures listed here exceeds the number of cases containing these procedures. There are about 1.24 procedures per selected surgery case.

EXHIBIT V-[illegible]

Proportion that Twenty Procedures/Cases Constitute of all Cases and OPE Cases at Impact Institutions, 1969, 1972, 1975

Year / Procedure	1969		1972		1975	
	% of OPE Cases	% of All Cases	% of OPE Cases	% of All Cases	% of OPE Cases	% of All Cases
Adenoidectomy	4.98%	3.24%	4.35%	3.08%	3.77%	2.64%
Tonsillectomy	6.95	3.5	5.76	4.08	3.92	2.75
Myringotomy-Without Tubes	.96	.63	.82	.58	.23	.16
Myringotomy-With Tubes	3.05	1.99	2.87	2.03	2.59	1.81
Diagnostic Dilation and Curettage	12.04	7.92	10.06	7.12	12.29	8.62
Diagnostic Laparoscopy	.23	.15	.78	.55	3.08	2.16
Laparoscopy with Bilateral Tubal Coagulation	.74	.48	2.18	1.54	4.07	2.86
Marsupialization, Bartholin Cyst	.11	.07	.45	.32	.19	.14
Breast Mass Excision	.68	.44	.90	.64	1.29	.91
Breast Biopsy	2.99	1.95	2.38	1.69	3.99	2.80
Augmentation Mammoplasty	.51	.33	.33	.23	.69	.48
Vasectomy	.05	.03	.29	.20	.61	.43
Circumcision	.45	.30	.52	.35	.72	.51
Inguinal Herniorrhaphy	4.58	2.98	4.11	2.91	5.32	3.73
Ganglionectomy	.45	.30	.82	.58	.53	.37
Exision of Exostosis	.34	.22	.37	.26	.19	.14
Excision of Lipoma	2.26	1.47	1.64	1.16	1.52	1.07
Removal of Fix Device	.17	.11	.21	.15	.57	.40
Recession, Eye Muscle	1.42	.92	.78	.52	.50	.35
Teeth Extraction	.23	.15	.37	.26	.73	.51

Note: Percents are not additive, due to multi-OPE cases. Procedure volumes were divided through by estimates of total and OP Surgery volumes at impact institutions in 1969, 1972, and 1975.

Source: Three-year sample of operating room logs and records at impact institutions.

The three gynecological procedures, D & Cs, diagnostic larparoscopies and laparoscopies with bilateral tubal coagulation, together constituted more than 13% of all surgery volume. With the other six procedures added in, a proportion of 28.4% of all surgery cases is obtained for 1975. These nine procedures, then, account for almost a quarter of all surgeries done by impact institutions. This proportion remained unchanged between 1969 and 1975. Some procedures were typically combined. For example, tonsillectomies and adenoidectomies (T & As) are a common pair, as were adenoidectomies and myringotomies, and diagnostic laparoscopies and D & Cs. Of these procedures, tonsillectomies, adenoidectomies, myringotomies, and excisions of lipomas, all experienced declining shares of total surgery volume between 1969 and 1975. Shares of D & Cs, breast biopsies, and inguinal herniorrhaphies experienced moderate increases. Shares for the two laparoscopy procedures increased dramatically. Laparoscopy is a relatively new procedure that was introduced into standard surgical practice in the U.S. during the late sixties. Of the remaining eleven procedures, three experienced decreases and eight, increases.

Exhibit V-82 confirms the impressions gained from magnitudes and shifts in procedure-specific volumes. Surgery rates of the selected procedures differed among themselves. Seven procedures experienced declines in their surgery rates. All four otorhinolaryngological procedures—adenoidectomies, tonsillectomies, and the two myringotomies—experienced declines, reflecting nationwide downward trends. Thirteen procedures experienced increases in surgery rates. Three of them, diagnostic laparoscopies, laparoscopies with BTC, and vasectomies, increased fifteen, five, and ten-fold respectively. Increased surgery rates of the two laparoscopy procedures reflect their general increase in utilization in recent years. With one exception, rates for remaining procedures all exceeded the rate for all selected procedures. Surprisingly, D & C's surgery rate grew less than the rate for all selected procedures and less than that for all OPE surgery cases. The D & C rate increase was approximately equal to that for all surgery cases (16.8%). The notion that D & Cs were the principal element in increasing surgery rates in Phoenix up is not supported by the evidence. Inguinal herniorrhaphies, laparoscopies, and breast biopsies, by virtue of their

Exhibit V-82

Surgery Rate per 10,000 Population of Twenty Selected Procedures Performed at Seven Primary Impact Institutions, 1969, 1972, 1975

Year Procedure	1969	1972	1975	Percentage Growth 1969-1975
Adenoidectomy	11.63	12.43	10.17	- 12.6%
Tonsillectomy	16.26	16.42	10.58	- 34.9
Myringotomy Without Tubes	2.25	2.34	.62	- 72.4
Myringotomy With Tubes	7.14	8.19	6.98	- 2.2
Dilation and Curettage (Diagnostic)	28.41	28.67	33.17	16.8
Laparoscopy (Diagnostic)	.53	2.23	8.32	1469.8
Laparoscopy, With Bilateral Tubal Coagulation	1.72	6.20	10.99	539.0
Marsupialization of Bartholin Cyst	.26	1.29	.52	50.0
Breast Mass Excision	1.59	2.57	3.49	119.5
Breast Biopsy	7.01	6.79	10.78	53.8
Augmentation Mammoplasty	1.19	.94	1.85	55.5
Vasectomy	.14	.82	1.64	1071.4
Circumcision	1.06	1.40	1.95	84.0
Inguinal Herniorrhaphy	10.71	11.70	14.37	34.2
Ganglionectomy	1.06	2.34	1.44	35.8
Excision of Exostosis	.79	1.06	.52	- 34.2
Excision of Lipoma	5.29	4.68	4.11	- 22.3
Removal Fixation Device	.40	.59	1.54	285.0
Recession, Eye Muscle	3.31	2.11	1.34	- 59.5
Teeth Extraction	.53	1.06	1.96	269.8
TOTAL PROCEDURES	101.27	114.15	126.33	25.1%

Source: Three-year sample of operating room logs and records at impact institutions.

shares and changes in surgery rates all played relatively larger roles in changing overall surgery rates. In sum, gynecological, urological, and general surgery procedures all experienced significant increases in surgery rates, while otorhinolaryngological procedures declined.

Exhibit V-83 shows how inpatient surgery rates for selected procedures and specialties changed in the Western U.S. between 1971 and 1975. Changes in these rates should not be expected to reflect accurately changes in the total surgical rate for Maricopa County because of the potential of an undetected shift to ambulatory settings (whereas the total surgical rate is available for Maricopa County). A decline in a Western inpatient rate may simply be the result of a procedure shifting to ambulatory settings. Similarly, surgery rates in Phoenix may have been affected by shifts to ASFs. Western rates may be viewed as low estimates of trends in total surgery rates. Three findings are evident from the table:

- The otorhinolaryngological surgery rate in the West declined
    - Tonsillectomy and Adenoidectomy surgery rate declined
    - Myringotomy surgery rate rose
- The gynecological rate rose, particularly for dilation and curettage
- The inguinal herniorrhaphy rate rose.

These changes in inpatient surgery rates generally correspond with changes in rates for greater Phoenix. The exception is myringotomies. Rates at the primary impact institutions for the myringotomy procedures taken together declined by 19.1% between 1969 and 1975, and by 27.8% from 1972 to 1975. Phoenix appears to be phasing out inpatient-performed myringotomies against Western trends. D & C rates increased more rapidly in

Exhibit V-83

Selected Procedure and Specialty Inpatient Surgery Rates per 10,000 Population for the Western United States, 1971, 1972, 1975

Year / Procedure	1971	1972	1975	Change 1971-1975
Tonsillectomy, Adenoidectomy	50.0	49.52	34.37	-31.3%
Myringotomy (Ear)	8.53	9.39	11.91	39.6
Otorhinolangology	N/A	94.21	86.34	N/A
D&C	25.4	34.15	34.37	35.3
Gynecology	112.7	141.74	154.00	36.6
Breast Surgery	13.7	12.24	15.70	14.6
Inguinal Herniorrhaphies	21.3	24.48	24.09	13.1

Source: National Center for Health Statistics, Surgical Operations in Short-Stay Hopsitals, United States, 1971; Discussions with Mary Moien and Abraham Ranofsky, January, 1977. The figures for 1975 are preliminary.

N/A = Not Available

the West than in Phoenix, while for inguinal herniorrhaphies and breast surgery Phoenix experienced a more rapid increase than did the Western U.S. as a whole.

Detailed discussions are provided on the following procedures, all with surgery rates exceeding 5.0 surgeries per ten thousand:

- Tonsillectomies and Adenoidectomies
- Myringotomies with Tubes
- Diagnostic D & Cs
- Diagnostic laparoscopies
- Laparoscopies, BTC
- Breast Biopsies
- Inguinal herniorrhaphies

Each of these procedures is discussed below in terms of case complexity and changing surgery rates by setting. Also, the reasons for changes in rates are assessed.

Tonsillectomies and Adenoidectomies (T & As). Exhibits V-84A and B and V-85A and B present in summary form the changes that occurred in complexity and surgery rates by setting. Both the tonsillectomies and adenoidectomies became somewhat less complex (that is, less likely to be performed in conjunction with other procedures) over time. Both procedures experienced rapid increases in single OPE cases between 1969 and 1972. Most single case tonsillectomies continued to be performed at IP settings. Single-case adenoidectomies were largely shifted to the FSASC settings. Adenoidectomies were by 1975, more likely to be performed alone; in 1969 they had always been done with tonsillectomies or myringotomies. Single-case tonsillectomies and

Exhibit V-84A

Tonsillectomies: Percentage Distribution of Procedure Complexity By Setting

SETTING 1969	IP/IPO	IP/OPE	OP	HAASC	FSASC	NO. TOTAL	% BY COMPLEXITY
Single OPE	0.0	97.4	2.6	0.0	0.0	488	31.7
Multi OPE	0.0	100.0	0.0	0.0	0.0	1050	68.3
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	99.2	.8	0.0	0.0	1538	100.0
1972							
Single OPE	0.0	98.5	1.5	0.0	0.0	838	47.9
Multi OPE	0.0	93.2	4.1	0.0	2.7	912	52.1
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	95.6	2.9	0.0	1.4	1750	100.0
1975							
Single OPE	0.0	87.0	0.0	10.9	2.2	575	44.6
Multi OPE	0.0	80.7	0.0	14.0	5.3	713	55.4
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	83.5	0.0	12.6	3.9	1288	100.0

Exhibit V-84B

Tonsillectomies: Surgery Rates per 10,000 population

Year Setting	1969	1972	1975
IP	16.12	15.71	8.83
OP	0.14	0.46	0.0
HAASC	0.0	0.24	1.34
FSASC	0.0	0.0	0.41
TOTAL	16.26	16.42	10.48

Exhibit V-85A

Adenoidectomies: Distribution of Procedure Complexity by Setting

SETTING 1969	IP/IPO	IP/OPE	OP	HAASC	FSASC	NO. TOTAL	% BY COMPLEX-ITY
Single OPE	0.0	0.0	0.0	0.0	0.0	0	0
Multi OPE	0.0	100.0	0.0	0.0	0.0	1100	100.0
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0
By Setting	0.0	100.0	0.0	0.0	0.0	1100	100.0
1972							
Single OPE	0.0	50.0	16.7	16.7	16.7	150	12.3
Multi OPE	0.0	71.3	3.2	1.1	24.5	1175	88.7
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	68.9	4.7	2.8	23.6	1325	100.0
1975							
Single OPE	0.0	28.6	0.0	0.0	71.4	88	28.9
Multi OPE	0.0	57.1	0.0	16.5	26.4	1139	71.1
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	55.5	0.0	15.2	29.3	1237	100.0

Exhibit V-85B

Adenoidectomies: Surgery Rates per 10,000 Population

Year Setting	1969	1972	1975
IP	11.62	8.56	5.64
OP	0.0	0.58	0.0
HAASC	0.0	0.36	1.54
FSASC	0.0	2.94	2.98
TOTAL	11.62	12.44	10.17

adenoidectomies shifted more to the ASF settings than did combined procedures. The "split-up" phenomenon, in which procedures formerly combined were then split-up into separate cases, apparently occurred with tonsillectomies, adenoidectomies, and perhaps myringotomies. For tonsillectomies, for instance, the proportion of single OPE cases went from 31.7% in 1969 to 44.6% in 1975. Surgery rates for these procedures declined significantly. Surgery rates at ASF settings rose but did not fully counteract the general decline. The decline in surgery rates appears to reflect Western and national trends. Surgicenter tended to specialize in single-procedure adenoidectomies and adenoidectomies combined with myringotomies. Tonsillectomies remained at IP settings or shifted to other ASFs. It is doubtful that Surgicenter (or the HAASCs) contributed to increase rates for this procedure (or reduce losses) over what would have occurred consistent with trends in the Western census region. The evidence suggests that nearly all adenoidectomies were drawn from IP settings at impact hospitals to the FSASC and HAASCs.

Unilateral and Bilateral Myringotomies with Tubes. As previously shown, myringotomies without tubes virtually disappeared as an institutional surgery procedure at impact institutions between 1969 and 1975. As shown in Exhibits V-86A and B, surgery rates of myringotomies with tubes also declined, by 2.2% from 1969 to 1975, and by 14.8% from 1972 to 1975. Fragmentary data suggest that myringotomies in the West rose from 1971 to 1975. Why this procedure declined in Phoenix while it rose elsewhere is difficult to determine. It does seem evident, however, that ASFs reduced the share and rate of myringotomies done in both the IP and OP settings. In fact, the decline in the rate of IP myringotomies slightly exceeded the increase in rates at ASFs. This decline in the general rate may be due in small part to the decline in the proportion of children in the population. Over time, myringotomies became relatively more complex, suggesting that myringotomies and adenoidectomies became more frequently performed in combination with one another. By 1972, Surgicenter specialized in performing multi-case myringotomies and both simple and complex myringotomies were drawn heavily into ASFs.

Dilation and Curettage (Diagnostic) (D & C). D & C is the single highest volume surgery procedure, both in the U.S. and in Maricopa County as shown in Exhibit V-87A and B. D & Cs represented 8.62% of all surgeries performed at impact institutions in 1975. Over time, the share has increased, but not by

Exhibit V-86A

Myringotomies with Tubes: Distribution of Procedure Complexity by Setting

1969	IP IPO	IP OPE	OP	HAASC	FSASC	No. TOTAL	% BY COMPLEXITY
Single OPE	0.0	85.7	14.3	0.0	0.0	438	64.8
Multi OPE	0.0	94.7	5.3	0.0	0.0	237	35.2
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	88.7	12.3	0.0	0.0	675	100.0%
1972							
Single OPE	0.0	17.1	11.4	17.1	54.3	438	50.0
Multi OPE	0.0	34.3	5.7	0.0	60.0	437	50.0
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	25.7	8.6	8.6	57.1	875	100.0%
1975							
Single OPE	0.0	12.0	4.0	28.0	56.0	313	36.8
Multi OPE	0.0	25.6	0.0	18.6	55.8	537	63.2
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	20.6	1.5	22.1	55.9	850	100.0%

Exhibit V-86B

Myringotomies With Tubes: Surgery Rates per 10,000 Population

Year Setting	1969	1972	1975
IP	6.34	2.11	1.44
OP	.80	.70	0.0
HAASC	0	4.49	1.54
FSASC	0	.70	3.90
Total	7.14	8.19	6.98

Exhibit V-87-A

Dilation and Curettage: Distribution of Procedure Complexity by Setting

1969	IP IPO	IP OPE	OP	HAASC	FSASC	No. TOTAL	% BY COMPLEXITY
Single OPE	0.0	88.1	11.9	0.0	0.0	1,575	58.6
Multi OPE	0.0	97.2	2.8	0.0	0.0	900	33.5
Mixed IPO & OPE	100.0	0.0	0.0	0.0	0.0	213	7.9
By Setting	7.9	84.2	7.9	0.0	0.0	2,688	100.0
1972							
Single OPE	0.0	42.5	10.8	7.2	39.5	2,088	68.2
Multi OPE	0.0	40.0	3.3	13.3	43.3	750	24.4
Mixed IPO & OPE	100.0	0.0	0.0	0.0	0.0	225	7.4
By Setting	7.4	38.8	8.2	8.2	37.5	3,063	100.0
1975							
Single OPE	0.0	43.0	13.8	23.6	40.5	2,438	60.4
Multi OPE	0.0	13.6	2.9	20.4	63.1	1,287	31.9
Mixed IPO & OPE	100.0	0.0	0.0	0.0	0.0	313	7.7
By Setting	7.7	17.6	9.3	20.7	44.6	4,038	100.0

Exhibit V-87B

Dilation and Curettage: Surgery Rates per 10,000 Population

Year Setting	1969	1972	1975
IP	26.16	13.23	8.43
OP	2.25	2.34	3.08
HAASC	0	2.34	6.88
FSASC	0	10.76	14.79
Total	28.41	28.67	33.17

much. The D & C surgery rate increased significantly, by 16.8% at impact institutions, an increase marginally larger than the increase in the total surgery rate. D & Cs are performed largely on women between the ages of 15 and 64. This population group increased by about 30.4% in Maricopa County between 1970 and 1975, while D & Cs increased by 50.2% between 1969 and 1975. About 70% of the growth in D & Cs can be accounted for by increases in population of women between the ages of 15 and 64 assuming that other factors remained constant. Other factors, such as increased access, lower relative prices, shifts from non-impact institutions may also have contributed to the increase. The D & C rate in Phoenix increased much less than elsewhere. According to the Hospital Discharge survey conducted by NCHS cited previously, the inpatient surgery rate for D & Cs in the West—an underestimate of the total D & C surgery rate—increased by 34.4% between 1971 and 1975, much more than the increase in total D & C surgery rate (16.8%) observed for the impact institutions.[6] To the extent that Western rates reflect general, and possibly long-run changes in D & C rates, the experience in Maricopa County appeared to run counter to those changes. It is difficult to hold, then, that the introduction of FSASCs and HAASCs boosted D & C surgery rates above levels that would have been expected otherwise. D & C rates did not increase much more than the total surgery rate in Maricopa County.

At IP settings, the D & C rate fell drastically, by about 60%, while rates at AMB settings rose sharply. About 8% of D & C cases were mixed, combinations of D & Cs with other IPO procedures. Complexity of D & Cs remained almost constant between 1969 and 1975. Surprisingly, D & Cs performed with other procedures shifted more to FSASC and HAASC settings than did single D & Cs. This may be accounted for in that D & Cs are often combined with laparoscopies. The laparoscopies were evidently rarely performed at traditional settings. By 1975 only 25.3% of D & Cs were IP. In 1975, Surgicenter alone did somewhat less than half of all D & Cs at impact institutions. In summary, Surgicenter and the HAASCs attracted large volumes of the most frequently performed surgery procedure out of traditional hospital inpatient and outpatient settings.

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[6] National Center for Health Statistics, Utilization of Acute Care Hospitals, Annual Summary, 1971, 1972, 1973, 1974.

Diagnostic Laparoscopies and Laparoscopies With Bilateral Tubal Coagulation (BTC). Diagnostic laparoscopies frequently were performed in tandem with D & Cs. Exhibits V-88 A and B and V-89 A and B show that over time these relatively new procedures were more frequently performed in combination with other procedures. By 1975, 56% of diagnostic laparoscopies and 21% of laparoscopies with BTC were combined with other OPE procedures, usually D & Cs. Complex cases were more likely to be performed at the Surgicenter and the two HAASCs than at IP settings. It is possible that Surgicenter specialized in performing combinations of D & Cs and laparoscopies that previously were not frequently performed in traditional surgical settings. Laparoscopy and laparoscopy with BTC are relatively new procedures with IP rates in 1969 of .53 and 1.72 surgeries per 10,000 population at the impact institutions. Laparoscopy rates at ASFs increased to levels that suggest few direct shifts had taken place. Laparoscopy with BTC is reportedly at least a partial substitute for some IPO gynecological procedures (hysterectomies and salpingo-oopherectomies). If so, increased laparoscopy BTC rates may have contributed to declining IP gynecological rates at impact institutions. Since IPO procedures were not individually tracked, this relationship cannot be evaluated. Gynecological inpatient surgery rates in Phoenix did decline and total gynecological surgery rates did rise by less than Western IP rates. Although the evidence is not definitive, and although the possibility of inter-procedure substitution exists, it appears probable that the two laparoscopy procedures may have contributed to maintaining total surgery rates from 1972 to 1975 at higher levels than in the late sixties.

Breast Biopsies. Of all procedures, breast biopsies are the most likely to be performed in multi and mixed cases. About an eighth of all cases containing breast biopsies are combined with IP procedures as shown in Exhibits V-90 A and B. This proportion remained relatively constant between 1969 and 1975. By 1975, about 70% of breast biopsies were still done inpatient. All mixed and about half of the multi-cases had remained inpatient. ASFs appear to be just initiating their handling of cases of this kind in that all substitutions took place after 1972. The IP surgery rate for breast biopsies did not decline, although it rose somewhat less (11.3%) than did the not directly comparable Western breast surgery rate (14.6%) over a shorter time period (1971 to 1975). The total rate for breast biopsies

Exhbit V-88A

Diagnostic Laparoscopies: Distribution of Procedure Complexity by Setting

SETTING 1969	IP/IPO	IP/OPE	OP	HAASC	FSASC	NO. TOTAL	% BY COMPLEXITY
Single OPE	0.0	50.0	50.0	0.0	0.0	25	50.0
Multi OPE	0.0	100.0	0.0	0.0	0.0	25	50.0
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	75.0	25.0	0.0	0.0	50	100.0
1972							
Single OPE	0.0	61.5	7.7	0.0	30.8	163	68.5
Multi OPE	0.0	50.0	16.7	0.0	33.3	75	31.5
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	57.9	10.5	0.0	31.6	238	100.0
1975							
Single OPE	0.0	33.3	6.7	13.3	46.7	375	37.0
Multi OPE	0.0	20.0	2.2	0.0	77.8	563	55.6
Mixed IPO & OPE	100.0	0.0	0.0	0.0	0.0	75	7.4
By Setting	7.4	23.5	3.7	4.9	60.5	1013	100.0

Exhibit V-88B

Diagnostic Laparoscopies:

Surgery Rates per 10,000 Population

Year Setting	1969	1972	1975
IP	0.40	1.29	2.57
OP	0.13	0.23	0.31
HASSC	0.0	0.0	0.41
FSASC	0.0	0.70	5.03
TOTAL	0.53	2.23	8.32

Exhibit V-89A

Laparoscopies BTC: Distribution of Procedure Complexity by Setting

SETTING 1969	IP/IPO	IP/OPE	OP	HAASC	FSASC	NO. TOTAL	% BY COMPLEX-ITY
Single OPE	0.0	100.0	0.0	0.0	0.0	163	100.0
Multi OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	100.0	0.0	0.0	0.0	163	100.0
1972							
Single OPE	0.0	6.8	25.0	0.0	68.2	550	83.0
Multi OPE	0.0	22.2	0.0	0.0	77.8	113	17.0
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0.0
By Setting	0.0	9.4	20.8	0.0	69.8	663	100.0
1975							
Single OPE	0.0	7.2	9.6	20.5	62.7	1038	77.5
Multi OPE	0.0	4.5	4.5	40.9	50.0	275	20.5
Mixed IPO & OPE	100.0	0.0	0.0	0.0	0.0	25	1.9
By Setting	1.9	6.5	8.4	24.3	58.9	1338	100.0

Exhibit V-89B

Laparoscopies BTC: Surgery Rates per 10,000 Population

Year Setting	1969	1972	1975
IP	1.72	0.58	0.92
OP	0.0	0.58	0.93
HAASC	0.0	1.29	2.67
FSASC	0.0	4.33	6.47
TOTAL	1.72	6.20	10.99

Exhibit V-90A

Breast Biopsies: Distribution of Procedure Complexity by Setting

SETTING 1969	IP/IPO	IP/OPE	OP	HAASC	FSASC	NO. TOTAL	% BY COMPLEX-ITY
Single OPE	0.0	95.2	4.8	0.0	0.0	525	79.2
Multi OPE	0.0	100.0	0.0	0.0	0.0	50	7.5
Mixed IPO & OPE	100.0	0.0	0.0	0.0	0.0	88	13.3
By Setting	13.2	83.0	3.8	0.0	0.0	663	100.0
1972							
Single OPE	0.0	97.8	2.2	0.0	0.0	563	77.6
Mixed IPO & OPE	0.0	100.0	0.0	0.0	0.0	75	10.3
Mixed	100.0	0.0	0.0	0.0	0.0	88	12.1
By Setting	12.1	86.2	1.7	0.0	0.0	725	100.0
1975							
Single OPE	0.0	67.5	2.4	19.3	10.8	1038	80.9
Multi OPE	0.0	44.4	11.1	11.1	33.3	113	8.6
Mixed IPO & OPE	100.0	0.0	0.0	0.0	0.0	162	12.3
By Setting	12.4	57.1	2.9	11.4	16.2	1313	100.0

Exhibit V-90B

Breast Biopsies: Surgery Rates per 10,000 Population

Year Setting	1969	1972	1975
IP	6.74	6.67	7.50
OP	0.26	0.12	0.30
HAASC	0.0	0.0	1.75
FSASC	0.0	0.0	1.23
TOTAL	7.01	6.79	10.78

in greater Phoenix rose significantly, by 53.8% between 1969 and 1975. The most relevant population category, women between the ages 15 to 64, increased by 30.4%, substantially less than growth in the number of breast biopsies, 98%. As with laparoscopies, the possibility that Surgicenter and the two HAASCs may have induced some new surgery utilization as a result of increased access to services cannot be ruled out. The evidence to support the notion that significant shifts occurred out of physicians' offices or between impact and non-impact hospitals is lacking.

Inguinal Herniorrhaphies. Inguinal herniorrhaphies, like breast biopsies, were just beginning to be performed at ASFs, by 1972. Exhibit V-91 A and B show that Surgicenter's share of this procedure increased from 13% in 1972 to 21% in 1975. The HAASC share was still minuscule in 1975. As with other procedures, Surgicenter drew off a larger proportion of multi-OPE than single OPE cases. Complexity of cases containing herniorrhaphies, did not change much between 1969 and 1975. The total surgery rate for this procedure increased by 34.6% between 1969 and 1975, from 10.7 to 14.4 surgeries per ten thousand. The IP rate rose by 3.6% while the FSASC rate rose substantially. The IP rate in the West for inguinal herniorrhaphies rose by 13.1% between 1971 and 1975. The difference between the growth in Western and Maricopa County IP rates suggests that considerable substitution among settings took place. But, the substantial increase in the total rate in the county suggests that other factors may have played a role. Physicians do not do inguinal herniorrhaphies in their offices, so substitution from that setting was not likely. Changes in the age and sex distribution of the population cannot explain the increased rate. Rates for inguinal herniorrhaphies rose faster than rates for all selected procedures (i.e., 34.2% versus 25.7%).

Other Procedures With Increased Surgery Rates. Of the remaining procedures—vasectomies, circumcisions, augmentation mammoplasties, ganglionectomies, and removals of fixation devices—increases in procedure-specific rates are due to a combination of factors. As with laparoscopies and breast biopsies, population changes may have contributed to the increases. Other possible factors may include:

- Shifts out of physicians' offices
- Changes in patient preferences (especially augmentation mammoplasties and vasectomies)

Exhibit V-91A

Inguinal Herniorrhaphies: Distribution of Procedure Complexity by Setting

SETTING 1969	IP/IPO	IP/OPE	OP	HAASC	FSASC	NO. TOTAL	% BY COMPLEX-ITY
Single OPE	0.0	96.9	3.1	0.0	0.0	800	79.0
Multi OPE	0.0	93.8	6.3	0.0	0.0	200	19.7
Mixed IPO & OPE	100.0	0.0	0.0	0.0	0.0	13	1.3
By Setting	1.2	95.1	3.7	0.0	0.0	1013	100.0
1972							
Single OPE	0.0	82.9	4.9	0.0	12.2	1025	82.0
Multi OPE	0.0	83.3	0.0	0.0	16.7	225	18.0
Mixed IPO & OPE	0.0	0.0	0.0	0.0	0.0	0	0
By Setting	0.0	83.0	4.0	0.0	13.0	1250	100.0
1975							
Single OPE	0.0	78.3	2.6	3.5	15.7	1438	82.2
Multi OPE	0.0	47.6	0.0	0.0	52.4	262	15.0
Mixed IPO & OPE	100.0	0.0	0.0	0.0	0.0	50	2.8
By Setting	2.9	71.4	2.1	2.9	20.7	1750	100.0

SOURCE: Three year sample of operating room logs and records. following seven Exhibits from same source.

Exhibit V-91B

Inguinal Herniorrhaphies: Surgery Rates per 10,000 Population

Year Setting	1969	1972	1975
IP	10.31	9.71	10.68
OP	0.39	0.47	0.30
HAASC	0.0	0.0	0.41
FSASC	0.0	1.53	2.98
TOTAL	10.71	11.70	14.37

- Changes in physician setting preferences (especially ganglionectomies and circumcisions)

None of the surgery rate increases for these procedures can be explained fully by substitution out of traditional settings. Four procedures, vasectomies, ganglionectomies, circumcisions, and augmentation mammoplasties may in some cases be performed in physicians' offices. Hence, some of the surgery rate increases may reflect shifts out of these offices. With vasectomies, augmentation mammoplasties, and, perhaps, circumcisions, personal preferences of patients are probably much more important than physicians in deciding whether to do them or not. These procedures are highly elective; the sense of urgency associated with them is not strong as with some other procedures. Changing population preferences probably explain a portion of the increases in surgery rates. The rate for teeth extractions reflects to some degree shifts out of both inpatient settings and dentists' or oral surgeons' offices.

Other Procedures With Decreased Surgery Rates. Three procedures, excisions of lipoma or sebaceous cysts, excisions of exostosis, and recessions or advancements of eye muscles, experienced substantial declines in surgery. Lipoma and sebaceous cysts and excisions of exostosis may be performed in physicians' offices as well as in institutional settings. The setting distribution reflects significant shifts to ASF settings for these procedures in 1972 and 1975. However, IP rates for all declined sharply. With the exception of excisions of lipoma or sebaceous cysts, absolute values of declines in IP volumes exceeded increases in volumes at Surgicenter and the HAASCs. With excisions of lipoma, the decline in the IP rate equals 53.5%. The total surgery rate for the procedure fell and the increase in the surgery volumes at ASFs did not compensate fully. It is possible that some substitution out of institutional settings into physicians' offices took place.

The evidence on individual procedures provides strong support for intersetting substitution. For all procedures, the growth proportion of surgery cases performed at FSASCs and HAASCs increased substantially. Since significant decreases occurred with four procedures, other procedures had more leeway to increase their rates before total surgery rates were affected. D & Cs increased at about the same rate as did total surgery volumes, and this did not contribute to increasing (or maintaining) total surgery rates. The two laparoscopy procedures (which were new procedures), breast biopsies and inguinal herniorrhaphies, all had increases in surgery rates that exceeded increases in rates for all selected procedures and all surgery cases. Increases in the demand for specific procedures may have occurred during the 1969 to 1975 period. However, the evidence does not support a finding that the presence of the FSASCs and HAASCs were the primary contributing factor to this increase. There is substantial evidence however, that with all procedures included in the study that significant shifts occurred among traditional IP, OP, and ASF settings at the impact institutions.

Summary of Findings

The procedure specific analysis of the twenty surgical procedures that are the highest volume procedures in the FSASC setting in 1975 resulted in the following major findings.

- The introduction of the FSASC apparently did not result in an increase in the surgery rate beyond what would have been expected by the secular increases or decreases in the trends of specific procedures and the introduction and increased popularity of relatively new surgical procedures for sterilization such as laparoscopy with bilateral tubal coagulation and vasectomy.

- By 1975, 50.7% of the cases containing at least one of the twenty procedures were performed in ambulatory surgical center settings compared with 5.6% in hospital outpatient settings at impact institutions. In 1975, almost two-thirds of the cases containing at least one of the twenty procedures were performed at the FSASC.

- The total surgical rate for cases containing at least one of the twenty procedures increased from 68.2 to 87.9 cases per 10,000 population at impact institutions. The inpatient setting rate, however, declined from 64.4 to 38.6 while the ambulatory setting rate increased from 3.8 to 49.3.

- Of the twenty high-volume procedures, thirteen increased in surgery rate between 1969 and 1975 and seven decreased. The procedures that experienced the highest percent increases were relatively new procedures: laparoscopy, laparoscopy with bilateral tubal coagulation, and vasectomy. The procedures that experienced the greatest percent decline in surgery rate between 1969 and 1975 were tonsillectomy, adenoidectomy, myringotomy without tubes, and eye muscle operations.

- Dilation and curettage was the single most frequently performed surgical procedure in both 1969 and 1975. This procedure experienced a 16.8% increase in the surgery rate over the time period. The increase was less than the increase for the dilation and curettage rate in the Western census region which went up by 34.4% over a comparable period.

FINDINGS: IMPACT OF MEDICARE REIMBURSEMENT ON FSASC SURGICAL DEMAND

The demonstration program to reimburse the facility fees for Medicare patients having surgery at the Surgicenter was begun in April, 1974. The purpose of this analysis is to examine the effect of that reimbursement policy on the demand for surgical services by Medicare patients at the Surgicenter. The interrelation of the impact of the demonstration reimbursement program is obscurred by the decision of the Surgicenter management since opening to charge Medicare patients only the coinsurance amount of the facility fee regardless of the Medicare reimbursement policy. Therefore, prior to the April, 1974 beginning of the formal reimbursement policy, an informal policy was in effect that had the equivalent financial impact on the Medicare eligible patients treated at the facility.

Exhibit V-92 shows the number and proportion of patients by quarter for the period 1970-1974 that reported Medicare (or the Surgicenter Medicare equivalent) as the expected principal source of payment for the facility fee. The totals by year are presented in Exhibit V-93. It can be seen that prior to the formal Medicare reimbursement program the percent of patients remained relatively constant over the time period ranging from 1.8% in 1970 to 2.3% in the first quarter of 1974. The trend in the proportion was not statistically different from zero with $r = -.28$ and a slope of -0.038 percent change per year as computed by the least squares line.

Exhibit V-92

Volume of Surgeries on Patients Reporting Medicare as Expected Source of Payment by Quarter at the Phoenix Surgicenter, 1970-1974

Year and Quarter / Medicare Age Group	1970								1971							
	I		II		III		IV		I		II		III		IV	
	N	%	N	%	N	%	N	%	N		N	%	N	%	N	%
Medicare < 65	0	0.0	0	0.0	1	0.1	0	0.0	3	0.3	1	0.1	0	0.0	1	0.1
Medicare > 65	10	4.0	16	2.5	9	1.3	8	1.0	20	2.1	23	2.2	21	2.3	26	2.5
Medicare Combined	10	4.0	16	2.5	10	1.4	8	1.0	23	2.4	24	2.3	21	2.3	27	2.6

Year and Quarter / Medicare Age Group	1972								1973							
	I		II		III		IV		I		II		III		IV	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Medicare < 65	0	0.0	3	0.2	7	0.6	1	0.1	2	0.1	2	0.1	6	0.4	8	0.5
Medicare > 65	25	2.1	26	2.0	28	2.3	18	1.4	37	2.3	38	2.1	26	1.6	24	1.5
Medicare Combined	25	2.1	29	2.2	35	2.9	19	1.5	39	2.4	40	2.2	32	2.0	32	2.0

Year Quarter / Medicare Age Group	1974							
	I		II		III		IV	
	N	%	N	%	N	%	N	%
Medicare < 65	5	0.3	6	0.3	3	0.2	2	0.1
Medicare > 65	38	2.0	47	2.5	45	2.7	46	2.8
Medicare Combined	43	2.3	53	2.8	48	2.9	48	2.9

Source: Surgicenter operating room log book 1970-1974

Exhibit V-93

Volume of Surgeries on Patients Reporting Medicare As Expected Source of Payment, By Year, at the Phoenix Surgicenter, 1970-1974

Year / Patient Category	1970		1971		1972		1973		1974	
	N	%	N	%	N	%	N	%	N	%
Medicare < 65	1	0.0	5	0.1	11	0.2	18	0.3	5	0.3
Medicare > 65	43	1.8	90	2.3	97	1.9	125	1.9	38	2.0
Total Medicare	44	1.8	95	2.4	108	2.2	143	2.2	43	2.3

SOURCE: Same as previous Exhibit.

Exhibit V-94 presents the number and percent of patients actually reimbursed by the Medicare program between the second quarter of 1974 and the third quarter of 1976. There has been an evident increase in both the number and proportion of Medicare patients at the Surgicenter over the course of the demonstration program. By the third quarter of 1976 the percent of Medicare patients had reached 7.1% of total compared with 4.0% in the third quarter of 1974. The increase in the proportion is statistically significant at the 5% level over the time period with r= .673 and a slope of .273 average change per quarter in the percentage.

Exhibits V-95 and V-96 graphically depict the increase in both the volume and proportion of patients reporting Medicare as the principal source of payment prior to the initiation of the demonstration program and Medicare patients actually reimbursed by the Medicare program after April, 1974. The apparent "step" increase in both trends between the first and second quarters may be attributed in part to the immediate effect of the demonstration program felt in the second quarter and to inconsistent reporting of Medicare as principal or secondary expected source of payment in the pre-program period.

Although the absolute level in the pre-program period may be an underestimate of the total number and percent of Medicare-eligible patients, the trend would not be expected to be affected. Furthermore, as shown in Exhibit V-97 the percent of Surgicenter patients who are 65 in the pre-program period remained relatively constant between 3.1% and 4.0%--substantially below the 4.0% to 7.6% Medicare volume experienced after the reimbursement program began.

Summary of Findings

The principal finding with respect to the impact of the Medicare reimbursement demonstration project on surgical demand at the FSASC is as follows:

- The demonstration program resulted in an increase in the volume and proportion of Medicare eligible patients having surgery performed in the FSASC setting. The trend in Medicare patient utilization continues to be upward two and one-half years after the beginning of the demonstration.

Exhibit V-94

Number and Percent of Patients Reimbursed by Medicare at the Surgicenter, By Quarters, 1974-1976

1974							
I		II		III		IV	
N	%	N	%	N	%	N	%
0	0.0	77	4.1	67	4.0	88	5.3

1975							
I		II		III		IV	
N	%	N	%	N	%	N	%
125	6.4	99	5.4	98	5.5	118	6.7

1976					
I		II		III	
N	%	N	%	N	%
139	7.6	88	4.8	123	7.1

SOURCE: Medicare Remittance Advices from Arizona Blue Cross, Inc.

Exhibit V-95

Number of Patients Reporting Medicare as Expected Source of Payment, and Number of Medicare Reimbursed Patients, by Quarter at Surgicenter, 1970-1976

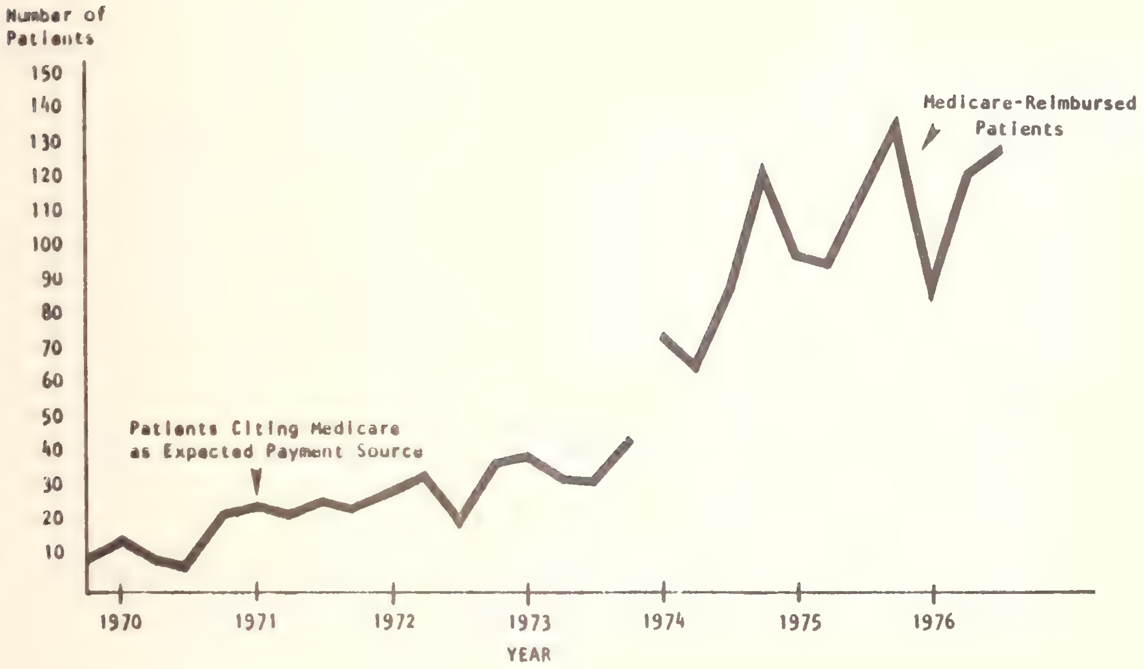

Exhibit V-96

Percent of Patients Reporting Medicare as Expected Source of Payment and Medicare Reimbursed Patients, by Quarter, as a Proportion of Surgicenter Volume, 1970-1976

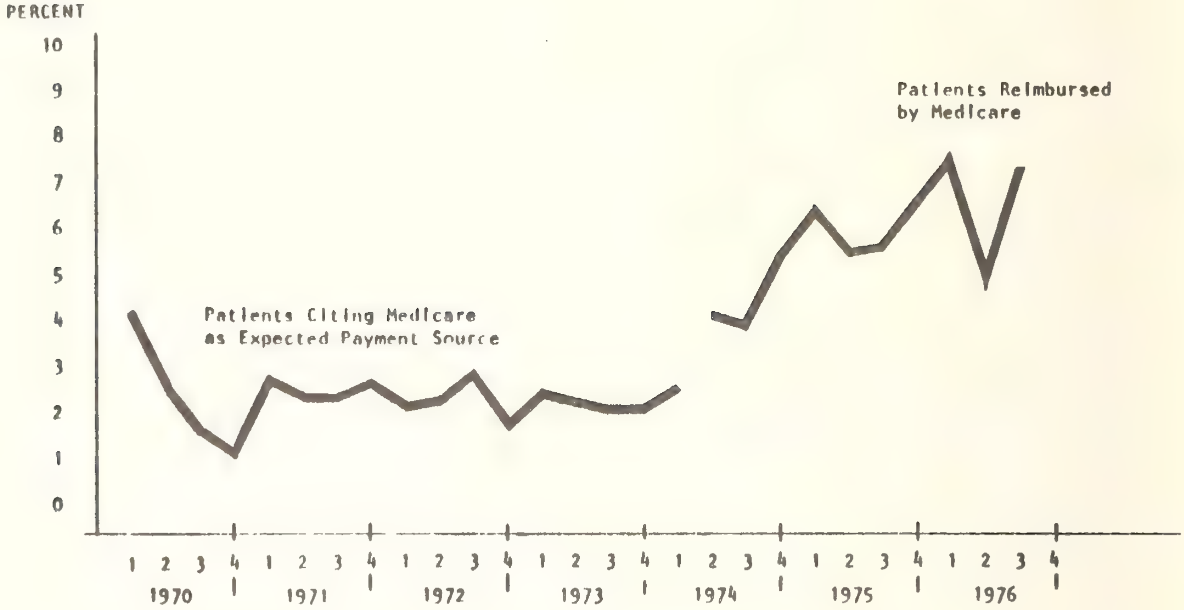

Exhibit V-97

Number and Percent of Patients Over 65 at Surgicenter by Sex, 1970-1974

Year / Age/Sex	1970		1971		1972		1973		1974	
	N	%	N	%	N	%	N	%	N	%
Male 65+	48	2.0	59	1.5	42	0.9	78	1.2	95	1.4
Female 65+	47	2.0	85	2.2	108	2.2	138	2.1	152	2.2
Combined 65+	95	4.0	144	3.7	150	3.1	216	3.3	247	3.6
Total Patients	2395		3889		4913		6510		6835	

SOURCE: Surgicenter Operating Room Log Book: 1970 - 1974.

SUMMARY OF FINDINGS

This section presents a concise summary of the major findings concerning FSASC impact discussed in earlier sections.

Findings Related to Surgical Demand

- The introduction of the Surgicenter in 1970 and the subsequent opening of two additional FSASCs and two HAASCs patterned after the Surgicenter concept seemed to cause a major change in the distribution of surgery among alternative surgical settings in Maricopa County.
- Both the volume and the proportion of surgery performed in ambulatory surgical settings exhibited statistically significant increases over the time period - from 4,236 surgeries, representing 7.5% of all surgeries in 1967 to 22,881 surgeries, representing 24.4% of all surgeries in 1975.
- The volume of surgery performed in inpatient surgical settings showed a significantly smaller percentage increase over the time period 1967 to 1975 (35.2%) than did the ambulatory and the total surgery volumes which increased by 440.2% and 65.6% respectively. As a result, the proportion of surgery performed in an inpatient setting declined from 92.5% in 1967 to 75.6% in 1975 with most of the decline occurring after 1970.
- By 1975, 59.9% of the surgeries performed in ambulatory surgical settings in Maricopa County were performed in FSASCs and HAASCs. FSASCs performed 39.2% of all ambulatory surgery in the county compared with 20.8% for the HAASCs. The remainder were performed in traditional hospital outpatient settings.

- Of the total increase in ambulatory surgery volume that occurred after 1969, 77.5% of the increase was made up of the increases in surgical volume at the FSASCs and HAASCs.

- Approximately 57% of the surgery performed at the Surgicenter in 1970, its first year of operation, was attributable to a shift in the location of surgery from the hospital outpatient setting. Shifts from hospital inpatient settings contributed to the remainder of the increase in the proportion of surgery performed at the FSASC.

- After a decline between 1969 and 1970 in both the volume and percent of surgery performed in hospital outpatient settings, the volume and percent of hospital based outpatient surgery increased steadily in Maricopa County. By 1975 the outpatient setting surgery volume was 9168 representing 9.8% of all surgeries performed in the county. A larger proportion of surgery was performed in hospital outpatient settings (9.8%) than in either FSASC (9.6%) or HASSC (5.1%) settings.

- The development of HAASCs at the two hospitals in Maricopa County was preceded by relatively high proportions of outpatient surgery at the institutions (as compared to most of the other hospitals in that year, as well as compared to those same 2 hospitals in subsequent years). Scottsdale Memorial Hospital performed 12.8% of its surgeries on an outpatient basis in 1970. Phoenix Baptist Hospital's OP surgeries represented 11.3% of total surgery volume in 1972. The HAASCs were generally patterned and modelled after the FSASC in design and operation.

- After the introduction of the HAASCs, the two hospitals rapidly phased out their outpatient surgery activity that used the hospital's main operating rooms. By 1975, Phoenix Baptist and Scottsdale Memorial were each performing less than 3.0% of their surgery in the traditional hospital outpatient setting.

Findings Related to Surgical Rates

- It does not appear that the introduction of the FSASCs and the HAASCs in Maricopa County resulted in increases in surgery rates above what may have been expected by secular increases in the rate commensurate with increases in the U.S. and the West and with changes in the composition of the population of Maricopa County.

- The increase in the total surgery rate in Maricopa County for the period 1968 to 1975 was approximately equal to the rate of increase of the total surgery rate in the Western census region assuming that the rate of outpatient to inpatient surgery in the West remained constant over the time period. If the ratio of outpatient to inpatient surgery in the West increased over the time period, the rate of increase in the total surgery rate in the West may in fact have exceeded the rate of increase in Maricopa County.

- The total surgery rate for Maricopa County increased over the time period 1967-1979 by means of two distinct "steps". The first step occurred in 1970 and raised the surgery rate from 66.0 surgeries per thousand in 1969 to 71.8 per thousand in 1970. This step increase lasted through 1972. The second step occurred in 1973 and raised the rate from 73.8 in 1972 to 77.3 in 1973. This step was generally maintained through 1975 although the rate declined somewhat in the last year.

- The major component of the first "step" increase that occurred in 1970 was an increase in the inpatient surgery rate. Almost 75% of the total rate increase appears to have been the result of the increase in the inpatient rate. The surgery rate at the FSASC contributed significantly less to the overall rate, and appears to have been largely composed of surgical procedures which had been shifted from the hospital OP setting.

- The major component of the second "step" increase that occurred in 1973 was the increase in the surgery rate at the FSASCs and HAASCs. The increase in the inpatient surgical rate was small and contributed little to the overall increase in the total rate between 1972 and 1973. However, it should not be interpreted that the presence of the FSASC and HAASCs were the causal factors in the overall increase in the surgical rate in 1973. The overall trend in the surgical rates for the entire time period is comparable with the increase in the U.S. and the Western census region.

- The inpatient surgical rate in Maricopa County was increasing prior to 1970 but after 1970 exhibited a statistically significant declining trend reflecting the substitution of ambulatory surgical settings for inpatient settings. This decline in the inpatient trend for Maricopa County ran counter to the general increase in the inpatient surgery rate experienced in the West and in the U.S.

- The ambulatory surgery setting rate increased more rapidly after the introduction of the FSASC in 1970 (2.389 average yearly increase in surgeries per thousand population) than in the period 1967-1969 (.350 average yearly increase in surgeries per thousand population) reflecting an increased shift to ambulatory surgical settings after the development of the ambulatory surgical facilities.

Findings Related to Utilization

- The introduction of the FSASC and the HAASCs at the impact institutions and the subsequent shifts in surgeries among settings that occurred did not result in any significant increase in the average length of stay for surgery inpatients during the period 1968 to 1975.

- The introduction of the FSASC and the HAASCs apparently contributed to a decline in the number of surgery inpatient days per 1000 population at impact institutions from 26.7 in 1970 to 22.9 in 1975. The total volume of inpatient surgery days declined at three of the six impact hospitals between 1969 and 1975 reflecting the shift in surgery volumes from inpatient to ambulatory settings.

- The number and rate of non-surgery inpatient days fluctuated widely between 1968 and 1975 apparently unrelated to the shifts in the volumes or rates of inpatient or ambulatory surgeries.

- Bed occupancy rates at the impact institutions declined sharply between 1967 and 1971 from 85.5% to 75.6%. This decline was apparently related to the general expansion in bed capacity during that period rather than the impact of the FSASC. The introduction of the HAASCs after 1971 apparently resulted in a temporary decline in the occupancy rates at these institutions in the two years after the HAASCs opened.

- The introduction of the FSASC and the HAASCs was followed by a slight decline in the number of surgical cases handled per operating room per year at the hospitals most impacted by the ambulatory surgical centers.

- The proportion of the surgery in patients over 65 at the impact hospitals did not change over the time period beyond the change that would be expected from the change in the age composition of the Maricopa County population.

- The FSASC and the HAASCs contributed to the decline in the proportion outpatient eligible cases done in inpatient setting from 62.1% in 1969 to 58.0% in 1975.

- The institutions that experienced the most significant decline in the proportion of outpatient eligible cases performed in the inpatient setting were the two institutions that opened HAASCs.

Findings Related to Surgical Resources

- After the introduction of the FSASC in 1970, the surgical center concept was widely replicated in Maricopa County by hospitals and several physician groups that planned and developed ambulatory surgical facilities based on the Surgicenter.

- By the end of 1976, three hospital-affiliated ambulatory surgical facilities (Phoenix Baptist, Scottsdale Memorial, and Phoenix General Hospitals) had opened in Maricopa County and one had been approved for opening in July, 1977. None of these facilities were located in the immediate vicinty of Surgicenter or competed directly with the Surgicenter for patients and physicians.

- Since the opening of the Surgicenter in 1970, four additional freestanding ambulatory surgical centers had opened. All are surgeon-owned and controlled. Only one is located in the immediate vicinity of the Surgicenter. Two are located in the eastern metropolitan area in the communities of Mesa and Tempe. The fourth is located in west Phoenix in the same area as Phoenix Baptist Hosptial.

- The number of hospital beds at institutions in Maricopa County rose substantially in the 1970's moving from 3458 beds in 1969 to 4549 beds in 1975—a 31.6% increase—with the major increase occurring in 1970 and 1972.

- The bed capacity per 1000 population also showed major increases in both 1970 and 1972. After 1972 the bed rate declined to 1967 levels as the population growth in Maricopa County caught up with the building expansion and some beds were taken out of service. The first major increase in the bed rate in 1970 corresponds with the increase in the inpatient surgery rate noted for that year.

- The number of operating rooms in Maricopa County increased substantially during the period 1968 to 1975 with 83 ORs in 1968 and 124 ORs in 1975 - a 49.4% increase. The operating rooms per 100,000 population increased very little between 1968 and 1971 with the major increase occurring in 1972 and 1973. The primary component of the increase in the OR rate between 1968 and 1973 was the development of ORs at the ambulatory surgical facilities.

- The two step increases in the total surgery rate for Maricopa County in 1970 and 1973 were accompanied by the increased hospital bed rate in 1970 caused by a major expansion of inpatient facilities in that year and by the increase in the operating room rate in 1973 that reflects the opening of additional operating rooms dedicated to ambulatory surgery in hospital and non-hospital settings.
- The total number of physicians practicing in Maricopa County increased by 59.2% over the period 1966 through 1975. The number of surgeons increased by 70.7% during the same period.
- The number of physicians per thousand population in Maricopa County fluctuated widely over the time period, however, a major increase was noted in 1970 and again in 1975. The surgeon rate increased consistently over the time period with no major gains noted in any single year.
- Based on the correlation analysis, it appears that the increase in the surgical volume was most strongly associated with the increase in the Maricopa County population and with the number of beds. If the population is held constant, the number of operating rooms, physicians, and surgeons lose explanatory power.

Findings Related to Revenues, Costs, and Prices

- For the impact institutions, the total hospital net revenues per inpatient day fluctuated widely between 1968 and 1975, however after 1970 there was no discernible trend in the net revenues per inpatient day.
- The total hospital net revenue rate also fluctuated considerably. However, no consistent pattern was observed over the time period.

- The net revenue from operating and recovery rooms per surgery case at the impact hospitals increased over the time period from $46.32 in 1968 to $77.08 in 1975.
- The net revenue rate for the operating and recovery rooms declined significantly from 50.6% in 1968 to 37.7% in 1975. The decline in the rate was statistically significant. The introduction of the FSASCs, and the HAASCs apparently affected the rate of return from the operating rooms by increasing the surgical mix complexity at the inpatient institutions.
- According to hospital administrators, the introduction of the FSASCs and the HAASCs did not produce financial insolvency or any major disruption in the financial stability of the impact institutions between 1970 and 1975.
- The introduction of the FSASC in 1970 seems to have had little or no effect on the proportion of total hospital revenues derived from operating rooms at the impact institutions.
- After the introduction of the FSASC, hospitals reacted by introducing flat fee per procedure pricing for a limited number of procedures done in traditional outpatient surgical settings.
- According to hospital administrators and procedure fee schedules, hospitals that opened HAASCs set their prices for procedures to be competitive with the FSASC.
- Prices for minor surgery at the impact institutions increased by 34% over the time period as compared with 45% for major surgery prices.

Procedure-Specific Findings

- The introduction of the FSASC apparently did not result in an increase in the surgery rate beyond what would have been expected by the secular increases or decreases in the trends of specific procedures and the introduction and increased popularity of relatively new surgical procedures for sterilization such as laparoscopy with bilateral tubal coagulation and vasectomy.

- By 1975, 50.7% of the cases containing at least one of the twenty procedures were performed in ambulatory surgical center settings compared with 5.6% in hospital outpatient settings at impact institutions. In 1975, almost two-thirds of the cases containing at least one of the twenty procedures were performed at the FSASC.

- The total surgical rate for cases containing at least one of the twenty procedures increased from 68.2 to 87.9 cases per 10,000 population at impact institutions. The inpatient setting rate, however, declined from 64.4 to 38.6 while the ambulatory setting rate increased from 3.8 to 49.3.

- Of the twenty high-volume procedures, thirteen increased in surgery rate between 1969 and 1975 and seven decreased. The procedures that experienced the highest percent increases were relatively new procedures: laparoscopy, laparoscopy with bilateral tubal coagulation, and vasectomy. The procedures that experienced the greatest percent decline in surgery rate between 1969 and 1975 were tonsillectomy, adenoidectomy, myringotomy without tubes, and eye muscle operations.

- Dilation and curettage was the single most frequently performed surgical procedure in both 1969 and 1975. This procedure experienced a 16.8% increase in the surgery rate over the time period. The increase was less than the increase for the dilation and curettage rate in the Western census region which went up by 34.4% over a comparable period.

Findings Related to Medicare Reimbursement

- The demonstration program resulted in an increase in the volume and proportion of Medicare eligible patients having surgery performed in the FSASC setting. The trend in Medicare patient utilization continues to be upward two and one-half years after the beginning of the demonstration.

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